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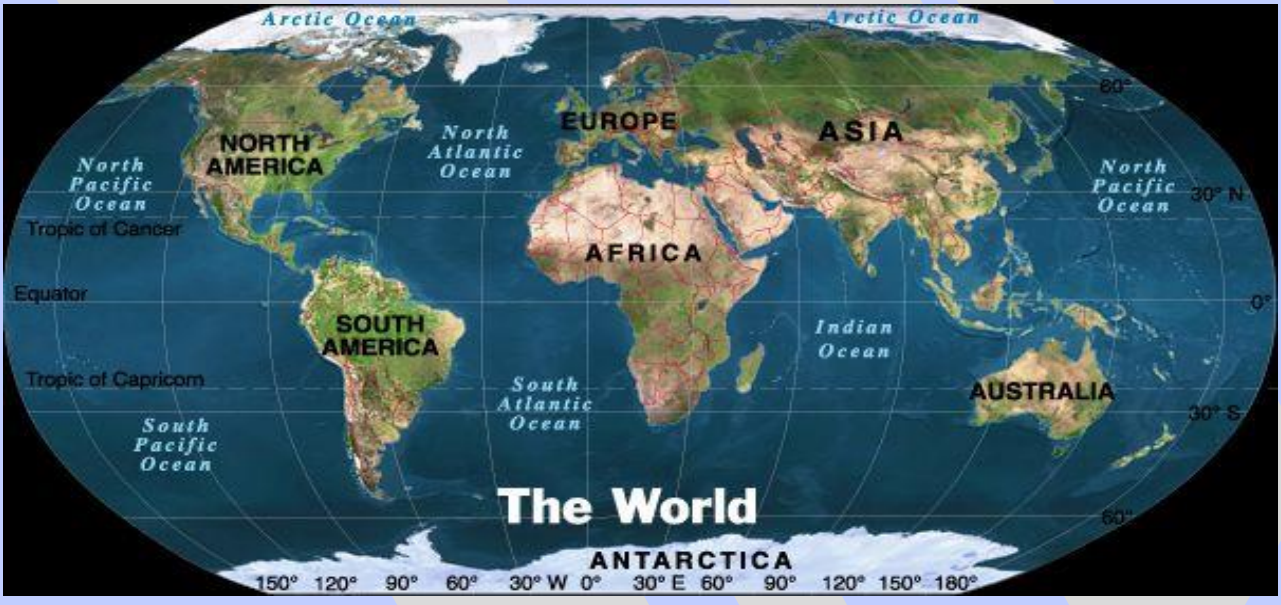


Daniel J.B. Mitchell

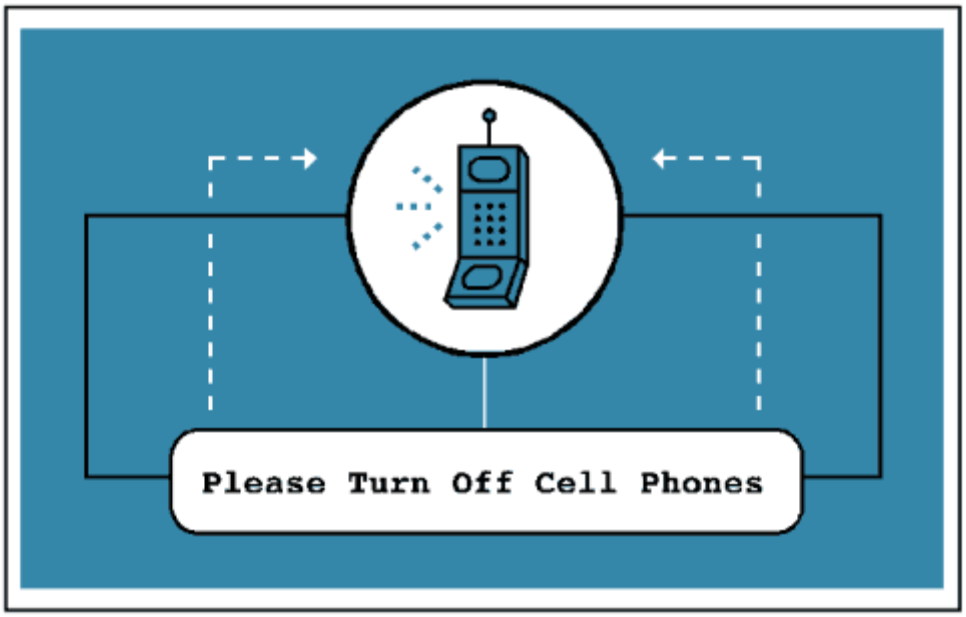
Ho-su Wu Professor

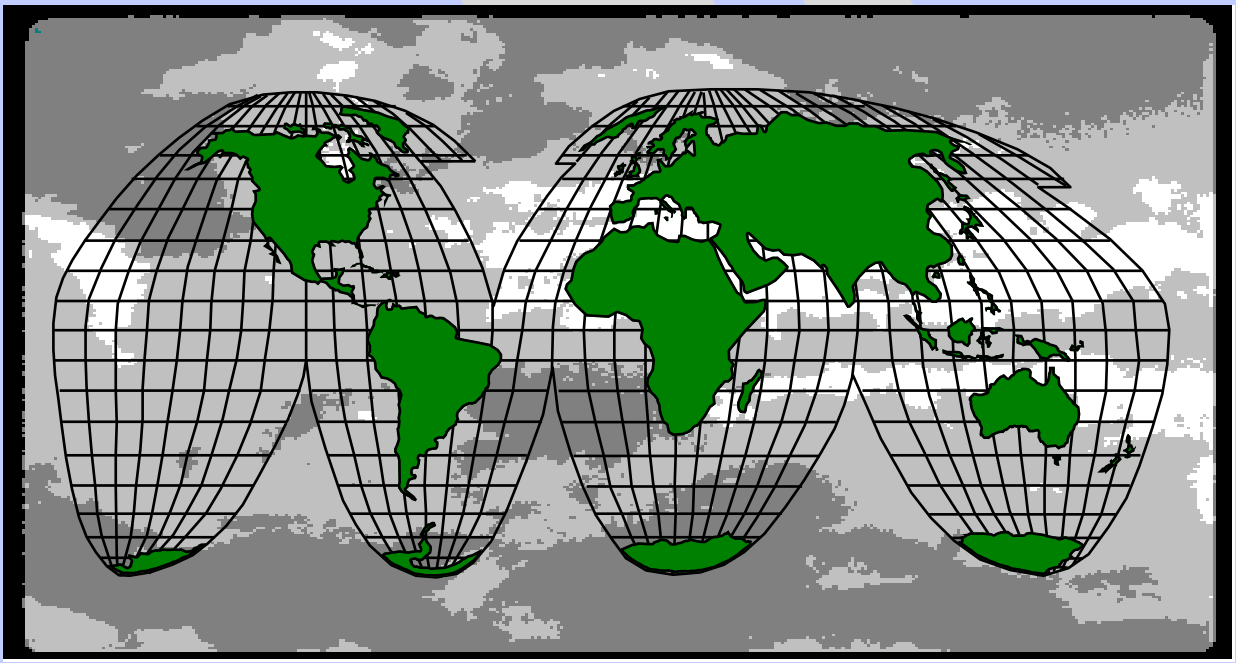
Anderson School

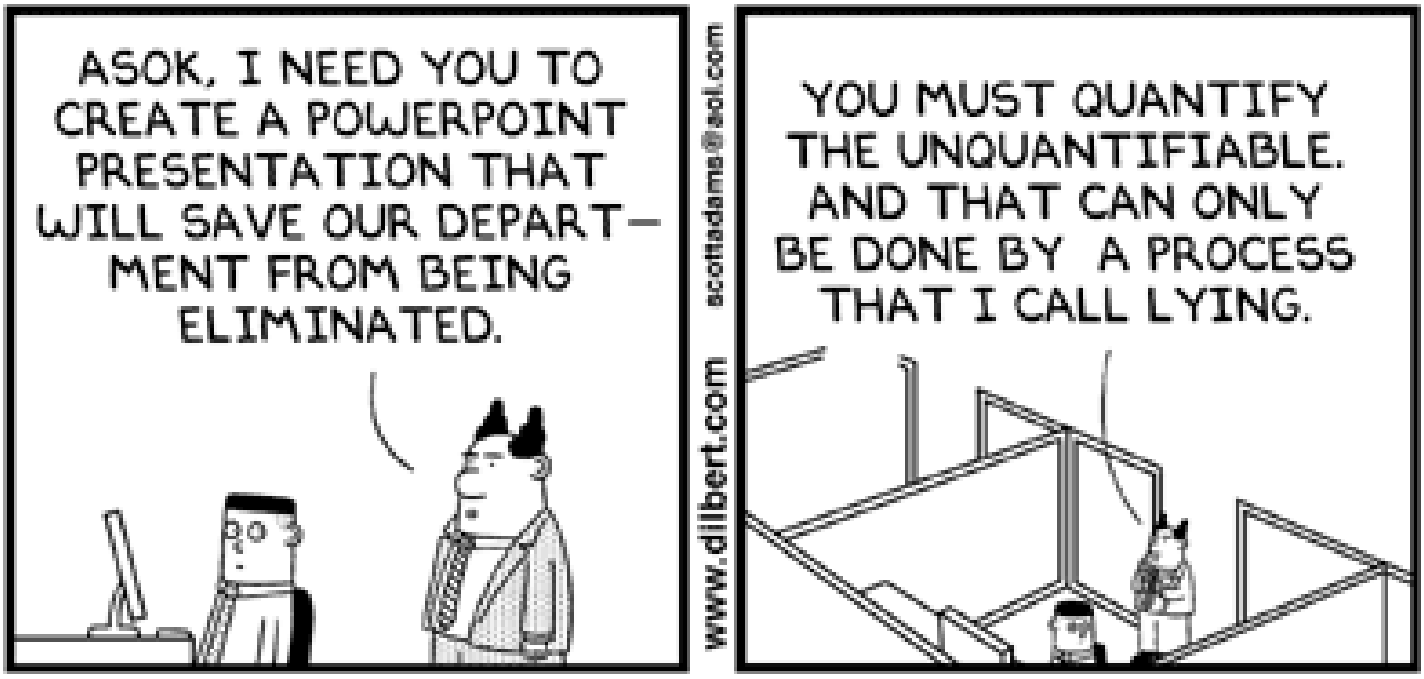
and

School of Public Affairs

Reminder






ASOK, I NEED YOU TO CREATE A POWERPOINT PRESENTATION THAT WILL SAVE OUR DEPART-MENT FROM BEING ELIMINATED.
YOU MUST QUANTIFY THE UNQUANTIFIABLE. AND THAT CAN ONLY BE DONE BY A PROCESS THAT I CALL LYING.
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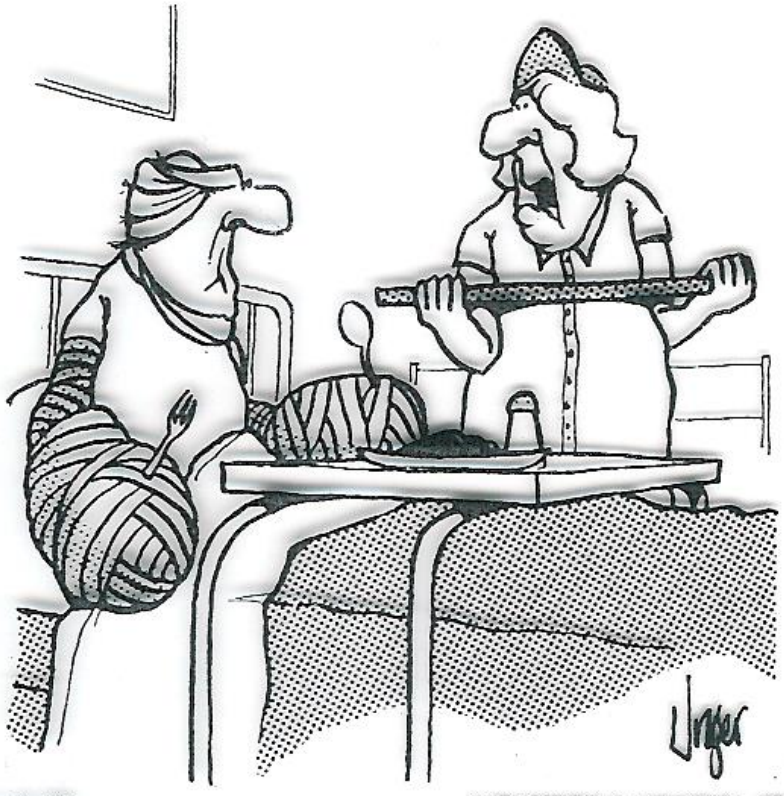
LA Times 1/6/98 E5

HERMAN By Jim Unger



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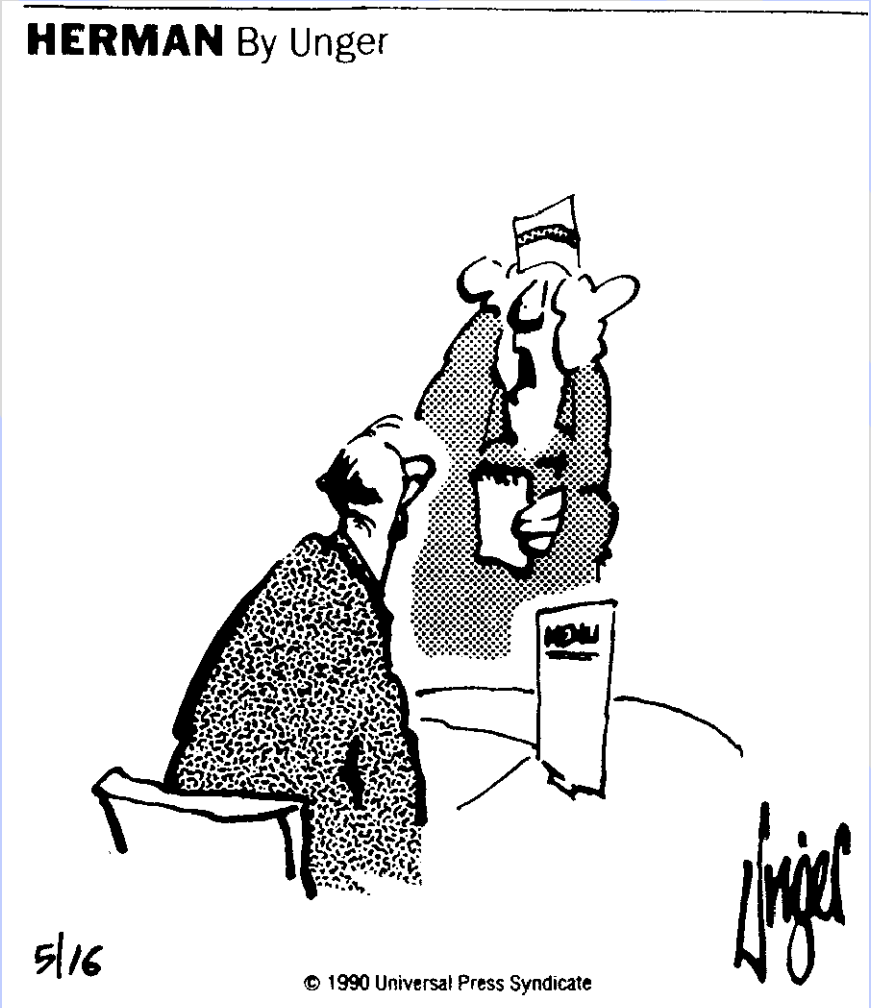
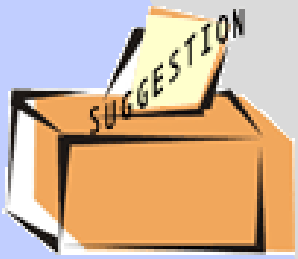
"What's with you ... don't you like spaghetti?"



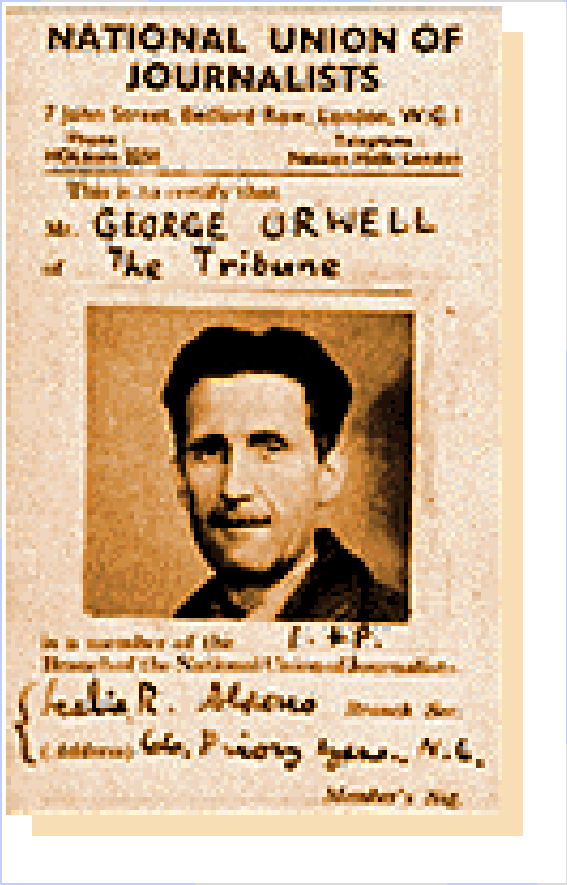
“You can’t have the soup of the day until the soup of yesterday is gone.”

Suggestion of the Ricardian Model:

The biggest gains from trade come from trade between countries which are very different.



An “Orwellian” Rationale?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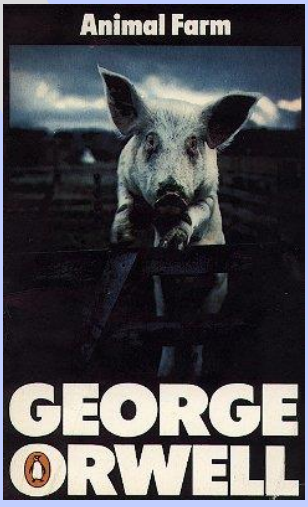

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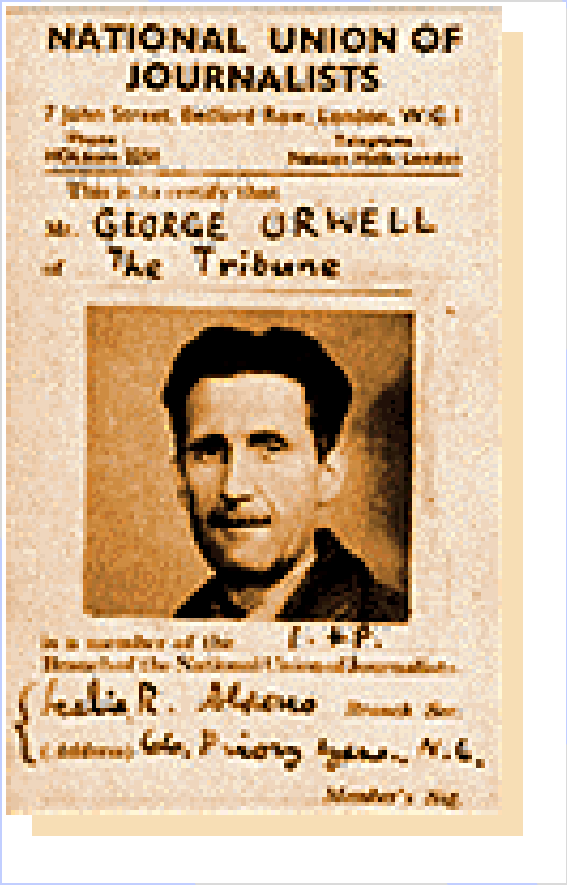
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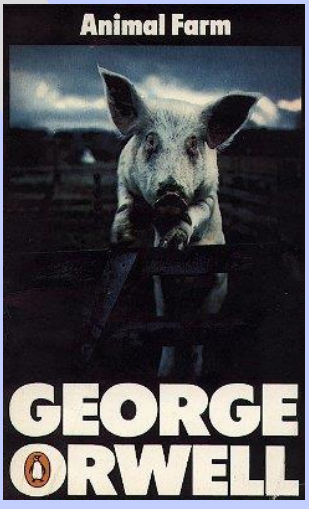
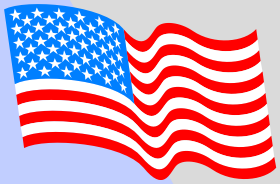
“ALL TRADE IS EQUAL BUT SOME TRADE IS MORE EQUAL THAN OTHER TRADE.”

- 

Additional Issues:

- **Is there always a benefit from trade? Could there be no benefit? No comparative advantage?**
- **What is effect of a taste shift?**
- **What is the effect of relative size of countries on benefits?**
- **Economies of scale**
- **Exchange rates**
- **Wages vs. productivity and unit labor costs.**

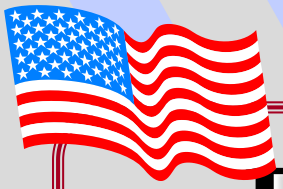
Revised Productivity Assumptions:



	US	UK
Wheat	**6 bu.**	**3 bu.**
Cloth	**10 yds.**	**5 yds.**

~~You got two tens for a five?~~

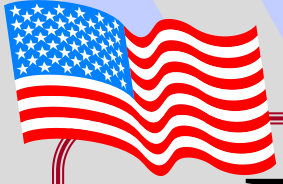
You got two fives for a ten?



Revised Demand Assumption:

A Taste Shift in the US

- US spends 60% of its income on wheat; 40% on cloth
- P_cC = .40 Income
- P_wW = .60 Income
- Thus, $P_cC = (2/3)P_wW$.
- "World" tastes shift towards wheat.
- <u>Result</u>: Terms of trade = .4
- UK welfare falls



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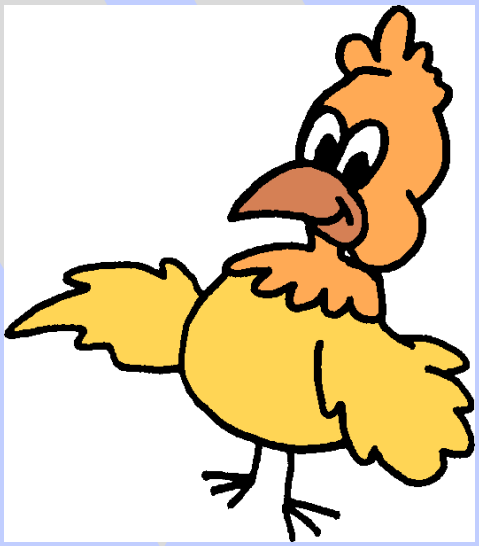
Revise (Increase) Size of UK

- **Labor supply = 3,750,000 hours (25% increase)**
- **<u>Result</u>: Terms of trade = .4**
- **Conditions in US become more like those in UK**
- **“Chicken heart” result**



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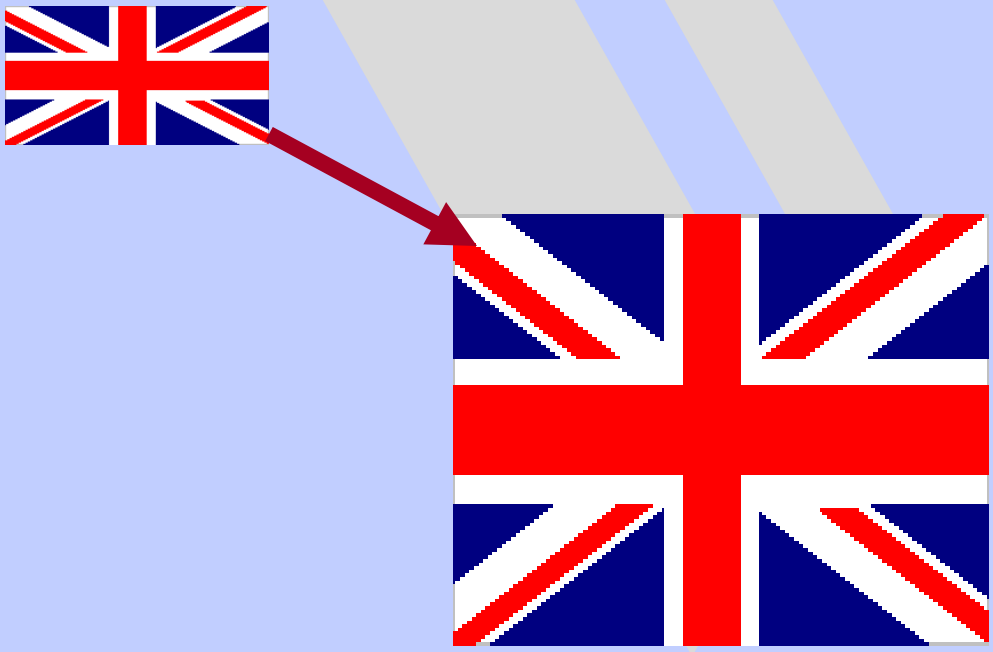
Revise (Increase) Size of UK

- **Note: What if UK productivity increased 25%?**
- **<u>Result</u>: Same as earlier (.4)**
- **<u>Moral</u>: More to sell but at a lower price (+ and -).**



Revise (Increase) Size of UK

- **In a closed economy, a 25% productivity increase would make folks 25% better off.**
- **Here, cloth lovers are better off by 25%. (1 hour buys 10 yds. instead of 8 yds.)**
- **But wheat lovers before got 8 x .5 = 4 bu. After they get 10 x .4 = 4 bu. So they are no better off.**
- **So part of productivity gain is lost in trade context as UK floods the market with cloth.**
- **Potential for "immizerizing" growth**

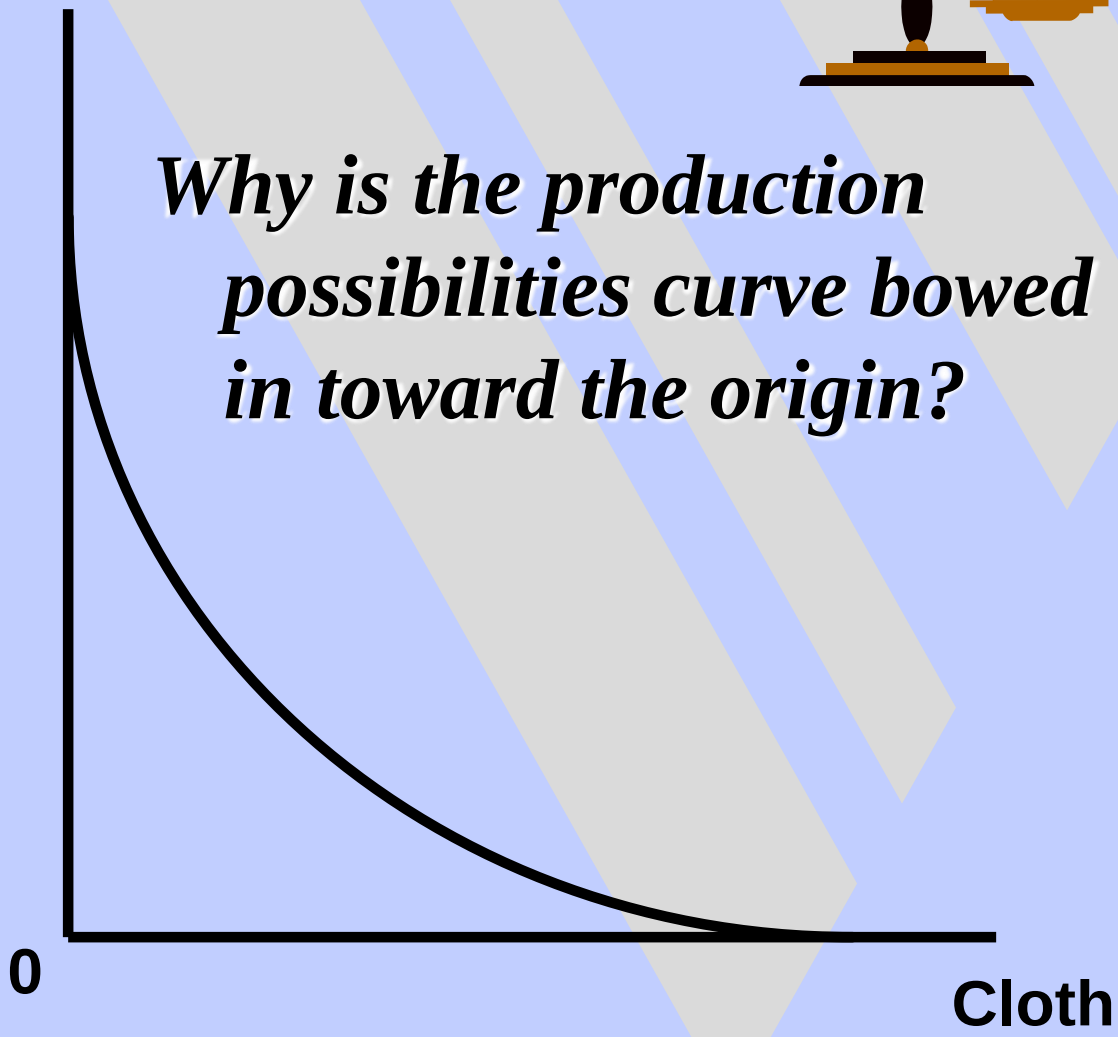
Scale Economies

- **Definition**
- **Small country benefits**
- **Getting there first**
- **Strategic trade policy**

Scale Economies

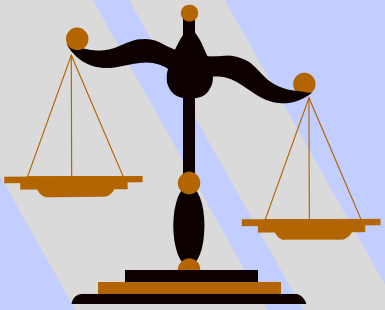
Wheat

Why is the production possibilities curve bowed in toward the origin?



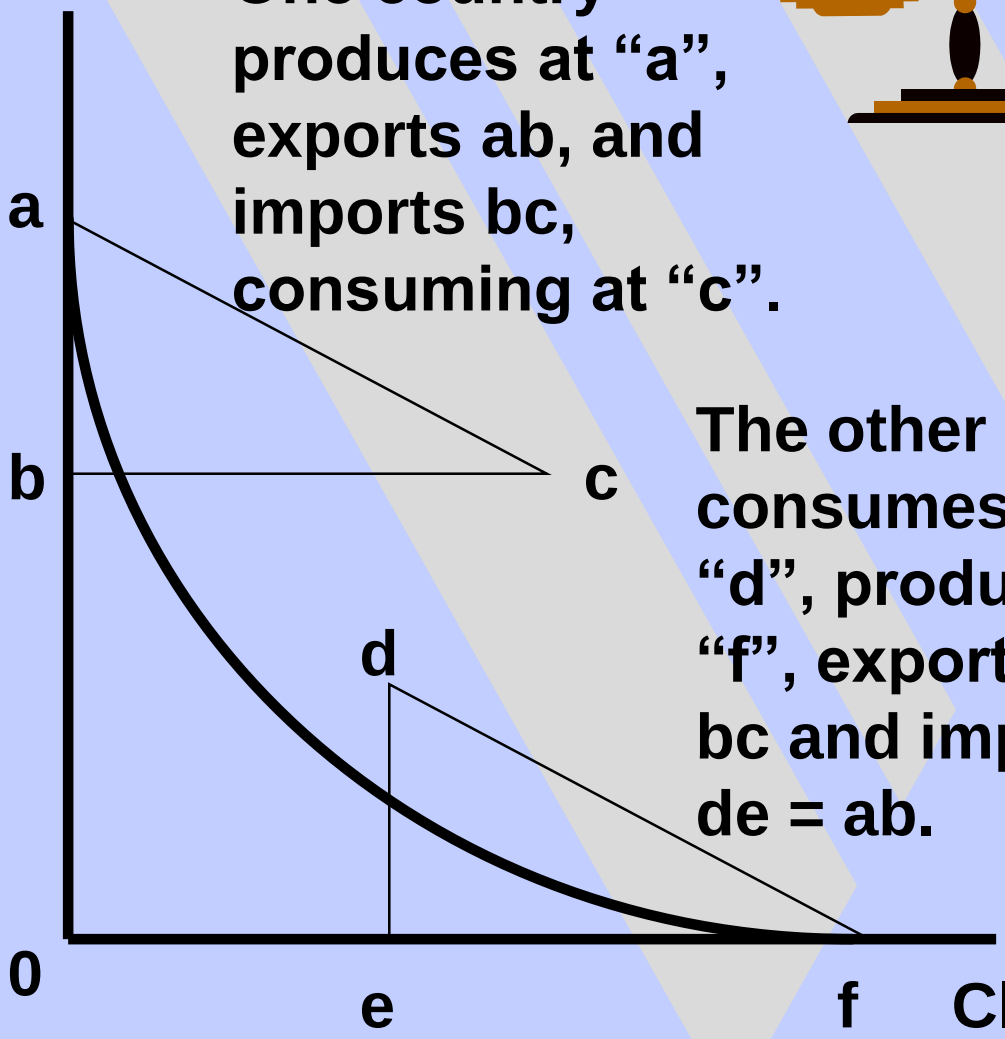
Scale Economies

Consider two *identical* countries



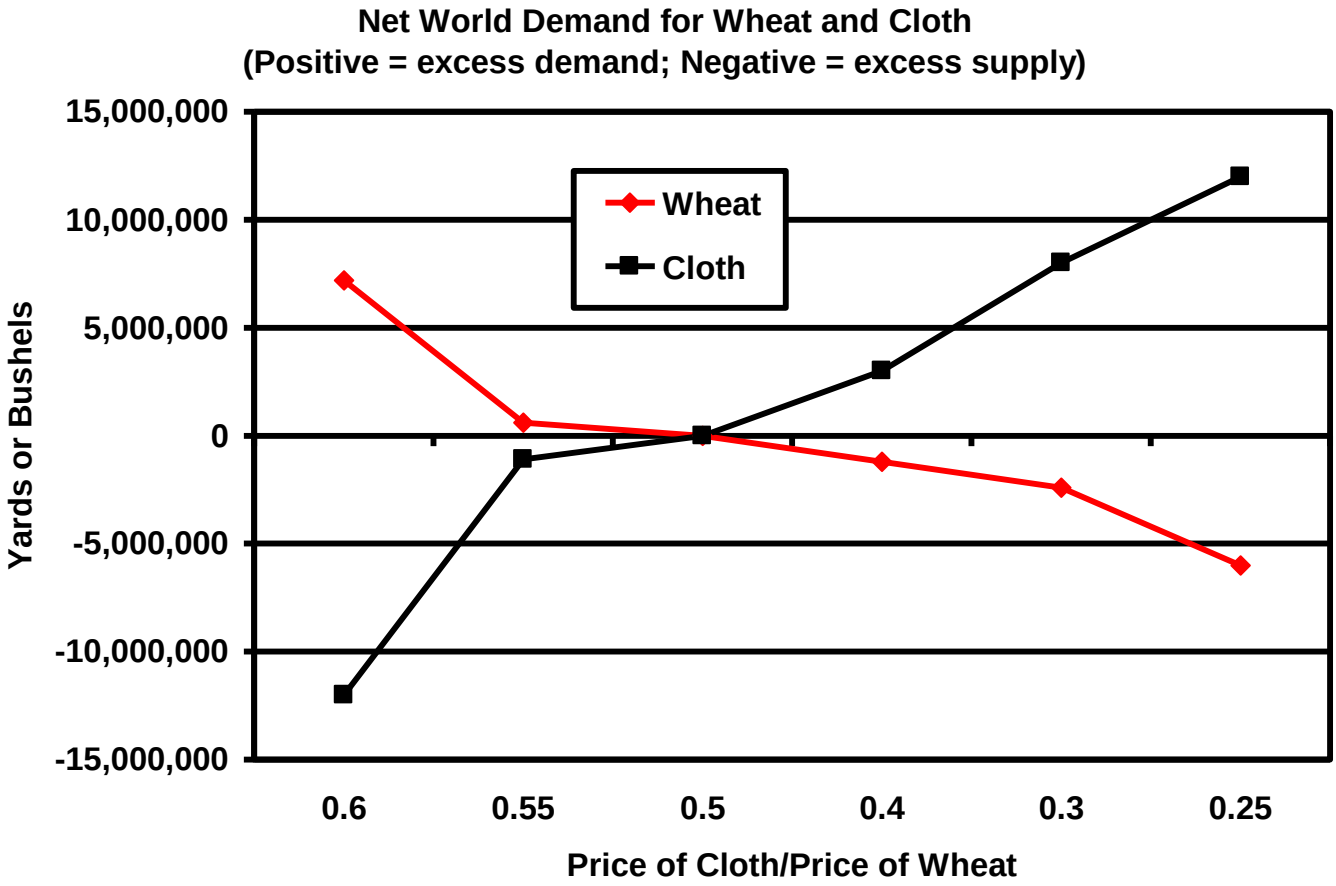
Wheat

One country produces at “a”, exports ab, and imports bc, consuming at “c”.



The other consumes at “d”, produces at “f”, exports ef = bc and imports de = ab.

Solution: US exports 6 million bushels of wheat; UK exports 12 million yards of cloth



Exchange Rate Determination:

US wage = $1/hour

UK wage = £1/hour

$$P_w = \$1/6 \text{ in US}$$

$$P_c = £1/8 \text{ in UK}$$

$$6{,}000{,}000P_w = 12{,}000{,}000P_c$$

$$\$1 = £1.5 \text{ or } £1 = \$.667$$

<u>Moral</u>: Once we know prices in national currency and productivities, we can determine exchange rate.

Inflation and the Exchange Rate

Inflation in US sends wage to $2/hour.

P_w = $2/6 = $1/3 = $.333... in US

P_c = £1/8 = £.125 in UK

$6{,}000{,}000P_w = 12{,}000{,}000P_c$

$1 = £.75 or £1 = $1.333...

Moral: **Double US price level; cut exchange value of dollar in half.**

Money-Changers

Agence France-Presse

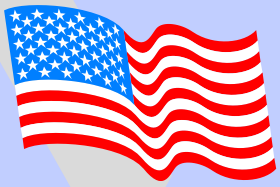
Thousands of people protested in East Berlin on Thursday, seeking an exchange rate of 1 to 1 for East and West German marks. The black market exchange rate is about five ostmarks (East German marks) to one West German deutschemark.

LA Times 9/6/90 D2

Wages vs. Productivity:

Wheat

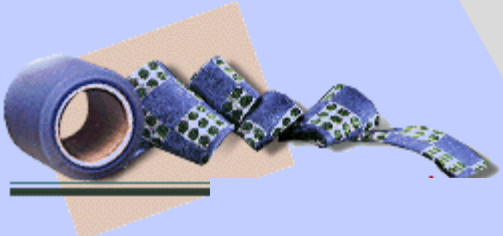
- W_{us} = \$1/hour
- W_{uk} = £1/hour
- Exchange rate: \$1 = £1.5
- US/UK wheat productivity ratio = 6 bu./2 bu. = 3
- US/UK wage ratio (in £s) = £1.5/£1 = 1.5
- 3 > 1.5
- So US exports wheat.



Wages vs. Productivity:

Cloth

- W_{us} = \$1/hour
- W_{uk} = £1/hour
- Exchange rate: \$1 = £1.5
- US/UK cloth productivity ratio = 10 yds./8 yds. = 1.25
- US/UK wage ratio (in £s) = £1.5/£1 = 1.5
- 1.25 < 1.5
- So UK exports cloth.



Unit Labor Costs:

US exports a product if:

$$[(Q_{us}/H_{us})/(Q_{uk}/H_{uk})] > W_{us}/W_{uk}$$

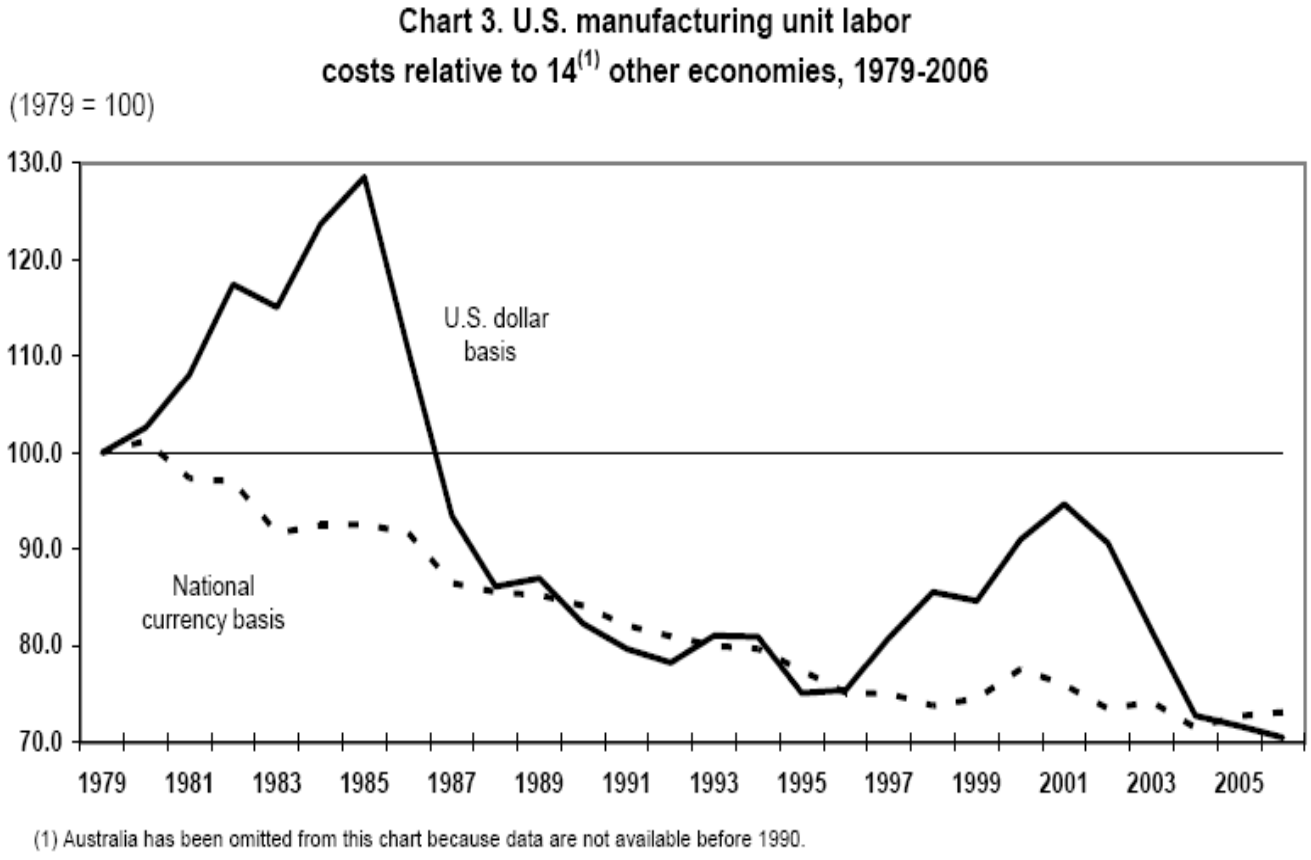
US productivity advantage outweighs its labor cost disadvantage.

Or: $$W_{uk}H_{uk}/Q_{uk} > W_{us}H_{us}/Q_{us}$$

Wage bill in UK per unit of output > wage bill per unit of output in US

Or: $$ULC_{uk} > ULC_{us}$$

Unit Labor Costs in Mfg. Through 2006, US = 100, Selected Countries (1979 Base)



Canada, Japan, Taiwan, Belgium, Denmark, France, Germany, Italy, Netherlands, Norway, Sweden, UK

Lemuel Ricketts Boulware, 95; Headed Labor Relations for G.E.

By JOAN COOK

Lemuel Ricketts Boulware, a former vice president of the General Electric Company who formulated a new approach to union management contract negotiations in the 1950's, died yesterday in Delray Beach, Fla. He was 95 years old.

He was under a doctor's care and died at his home, a spokesman for the company said.

Mr. Boulware was vice president of employee and public relations at General Electric from 1956 to 1961, when he retired. He had been responsible for employee relations since 1947, a year after the company went through what it considered a disastrous strike,

He helped develop practices in the company's relations with employees, unions, stockholders, community neighbors and government at all levels through a program intended to inform these groups that General Electric was trying "to do right voluntarily."

A 'Fair, Firm Offer'

In a bargaining policy that came to be known as Boulwarism, the company listened closely to union demands, examined the wages and working conditions of competitors, conducted extensive research on all issues and then put forward a "fair, firm offer," with nothing held back for future concessions.

Although General Electric was unhappy with the term "Boulwarism," calling it a "hostile label," the basic bargaining policy that it embraced became the hallmark of the company's dealing with its organized employees in the 1950's and 1960's.

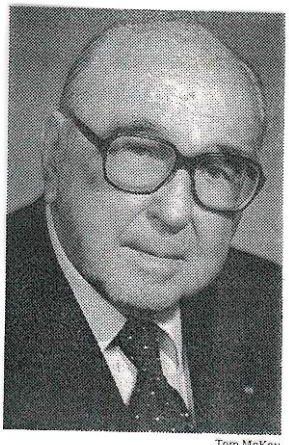
Labor's view of the policy was summed up by Paul Jennings, president of the International Union of Electrical Workers. At a convention of the A.F.L.-C.I.O. in Atlantic City in 1969, he called the policy "telling the workers what they are entitled to and then trying to shove it down their throats."

After a nationwide strike in 1969 and various court decisions that went against General Electric, the company modified its approach the next year and Boulwarism largely faded from the scene.

Later, in discussing labor relations, Mr. Boulware said labor problems should be "thought out, not fought out." He also said compulsory union membership was "wrong in principle and bad in practice." He opposed third-party intervention in labor negotiations.

Mr. Boulware was born in Springfield, Ky., and graduated from the University of Wisconsin in 1916, where he was captain of the baseball team. After graduation he taught accounting and commercial law at the university. He also taught at the Plymouth Institute night school in Brooklyn and at Florida Atlantic University.

He served in World War I as an infantry captain, and in World War II he was operations vice chairman of the War Production Board, for which he was awarded the Presidential Medal of Merit and a Navy citation.



Tom McKay

Lemuel Ricketts Boulware

Before Mr. Boulware joined General Electric, he worked for five companies in a number of positions like accountant, purchasing agent, comptroller and factory and marketing manager. In 1935 he joined the Carrier Corporation as vice president and general manager. From 1940 to 1942 he was vice president and general manager of the Celotex Corporation in Chicago.

Business and Professional Ties

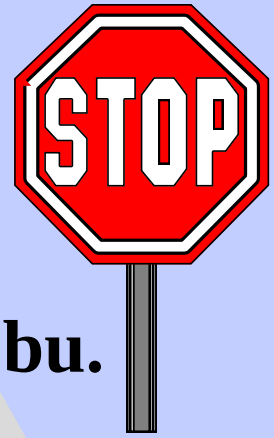
He joined General Electric in 1945 to head its affiliated manufacturing companies. While at G.E. he was a director of numerous companies, chairman of the Marketing Executives Society, director of the American Management Association and a member of various committees of the United States Chamber of Commerce, the National Association of Manufacturers and the Commerce and Industry Association of New York.

He was the author of two books. The first, "The Truth About Boulwarism" (1969; Bureau of National Affairs), using General Electric as an example, dealt with measures that business executives and their companies could use to gain public confidence and with steps to help workers understand business economics.

The second book, "What You Can Do About Inflation, Unemployment, Productivity, Profit and Collective Bargaining" was published in 1972.

Mr. Boulware's wife, the former Norma Brannock, died in 1987. There are no immediate survivors.

Preview: *A US Trade Restriction*



Free trade: US exports 6 million bu. of wheat for 12 million yds. of cloth.

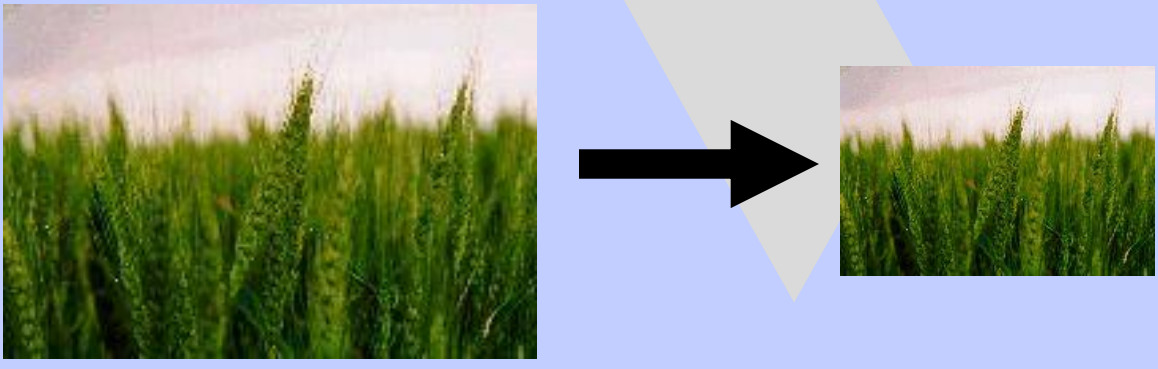
$P_c/P_w = 6/12$

Suppose the US imposes wheat export quota of 4.8 million bu.

Then: $P_c/P_w = 4.8/12 = .4$

Hence: US terms of trade improve and UK terms of trade deteriorate.

Hence: US is made better off by restriction; UK is made worse off.



Ricardian Model:
Lessons

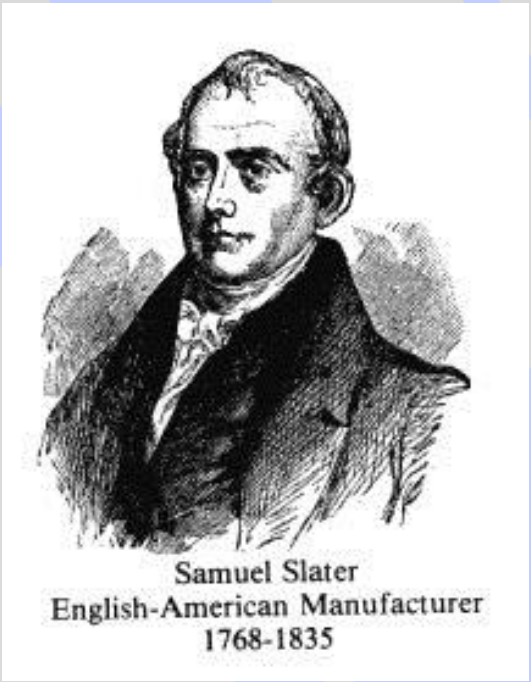
- **Comparative advantage is based on autarky prices.**
- **Technological differences can be a basis of comparative advantage.**
- **Generally, every country has a comparative advantage.**
- **But exchange rate, quality, and transactions costs can choke off trade.**

Ricardian Model:
More Lessons

- **The terms of trade ratio is a national welfare index.**
- **With equilibrium exchange rates, absolute costs reflect comparative advantage.**
- **<u>Preview</u>: Exchange rates reflect demand & supply for traded goods.**
- **<u>Preview</u>: A trade restriction may benefit a country (terms of trade effect).**

Remaining Questions

- **Can there be benefits from trade if technology is the same across countries?**



Samuel Slater
English-American Manufacturer
1768-1835

????

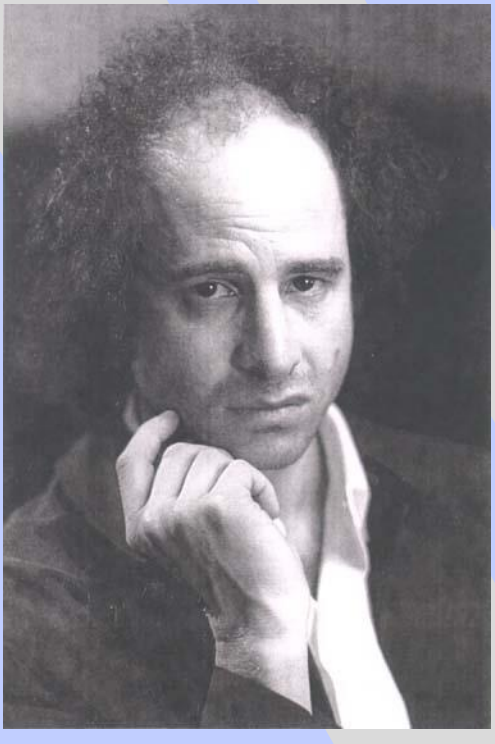
Remaining Questions

- **Can there be benefits from trade if technology is the same across countries?**
- **Can the model be made more realistic by avoiding the conclusion of total specialization?**
- **Doesn't trade affect income distribution? Does everyone gain equally? No winners and losers?**
- **What about assumption of full employment? Doesn't trade influence factor utilization?**

????

“You can’t have everything. Where would you put it?’

Stephen Wright



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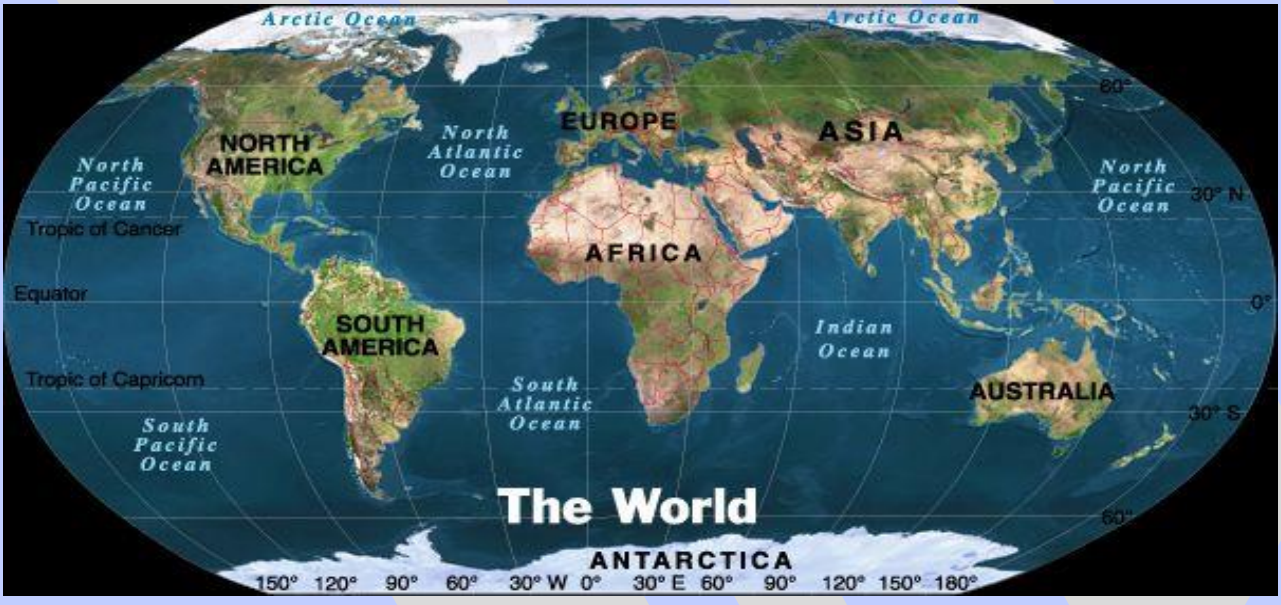


Daniel J.B. Mitchell

Ho-su Wu Professor

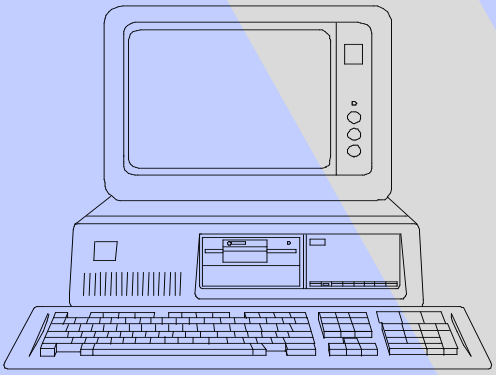
Anderson School

and

School of Public Affairs

The Two-Factor Model

LABOR



CAPITAL

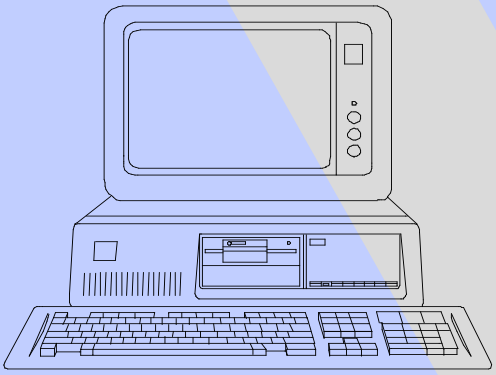
Production Function

I'd love to come over and hang out, but now that we're competing in a global economy I can't.

I HAVE NO CLUE
WHAT'S GOING ON

The Two-Factor Model

LABOR

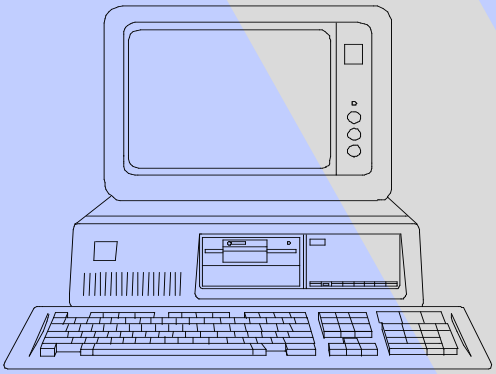


CAPITAL

Production Function

The Two-Factor Model

LABOR

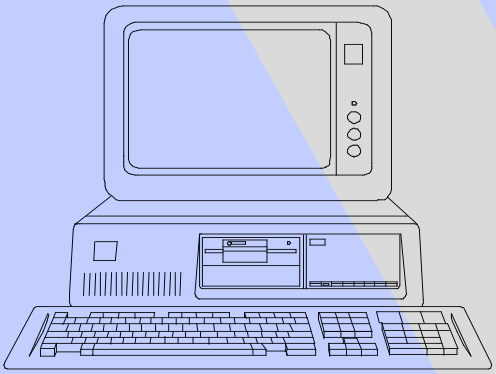


CAPITAL

Production Function

The Two-Factor Model

LABOR

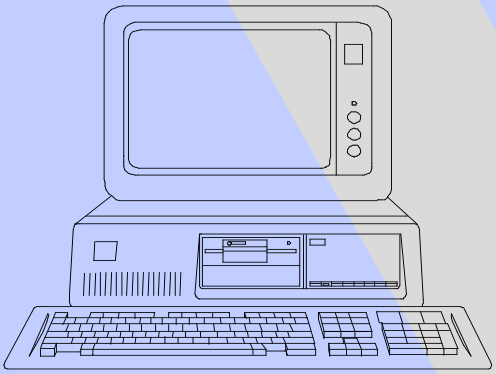


CAPITAL

Production Function

The Two-Factor Model

LABOR



CAPITAL

Production Function

Output

Ricardian Production Function

Output = f(Input)

Output = f(labor)

Wheat Example (U.S.)

Bushels of wheat (Q) = f(labor hours [L])

or Q = 6L

•	US	UK
wheat	6 bu.	2 bu.
cloth	10 yds.	8 yds.

2-Factor Production Function

Q = f(K,L)

Constant returns to scale

nQ = f(nK,nL)

Marginal product of labor (MP_L) > 0

Marginal product of capital (MP_K) > 0

Diminishing marginal products.

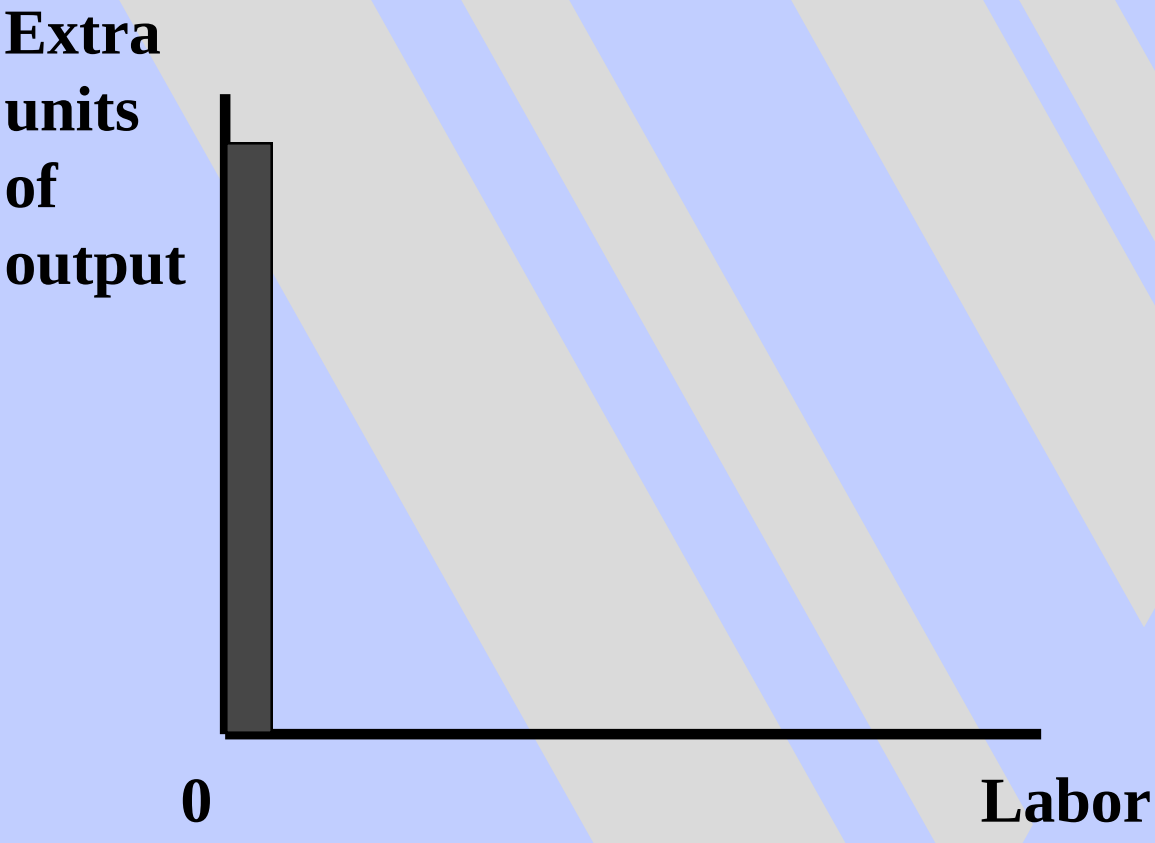
Profit-Maximizing Condition:

Wage/rental ratio = marginal product of labor/marginal product of capital

$$w/r = MP_L/MP_K$$

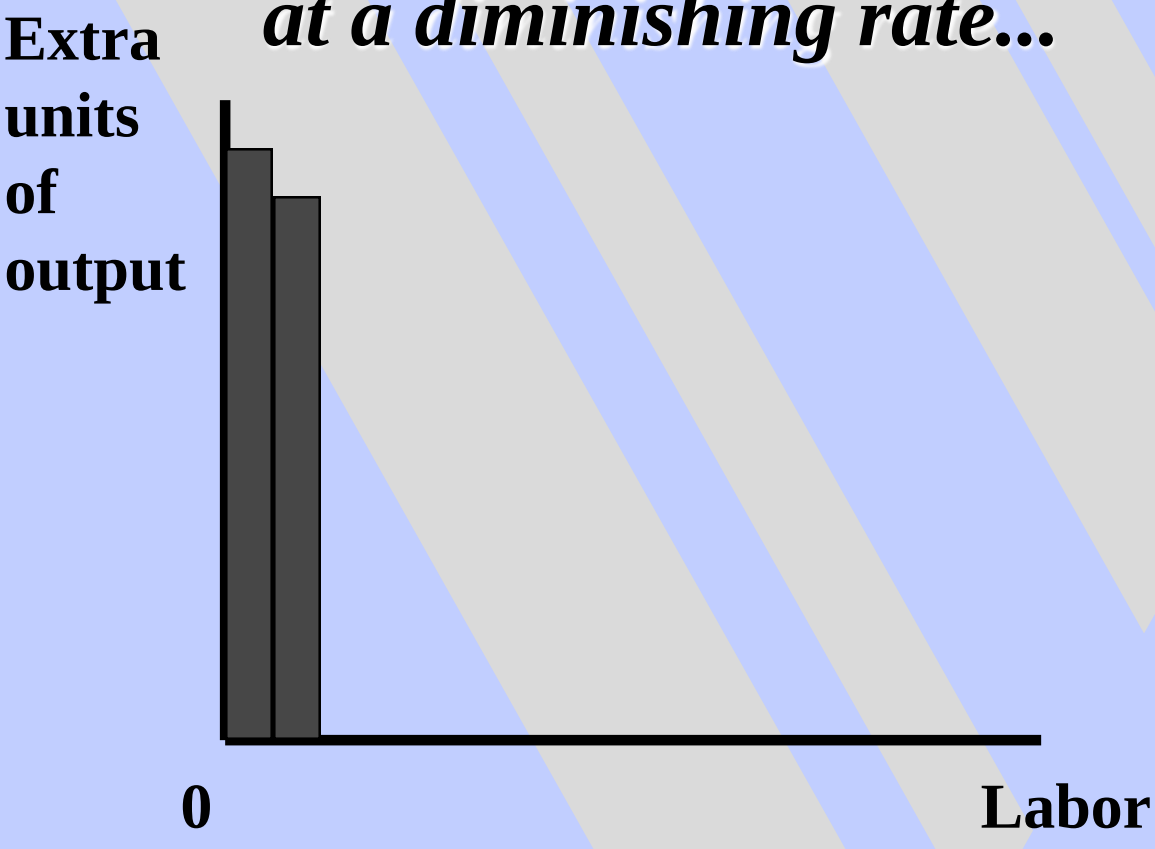
Version 1

Considering One Factor at a Time: Labor



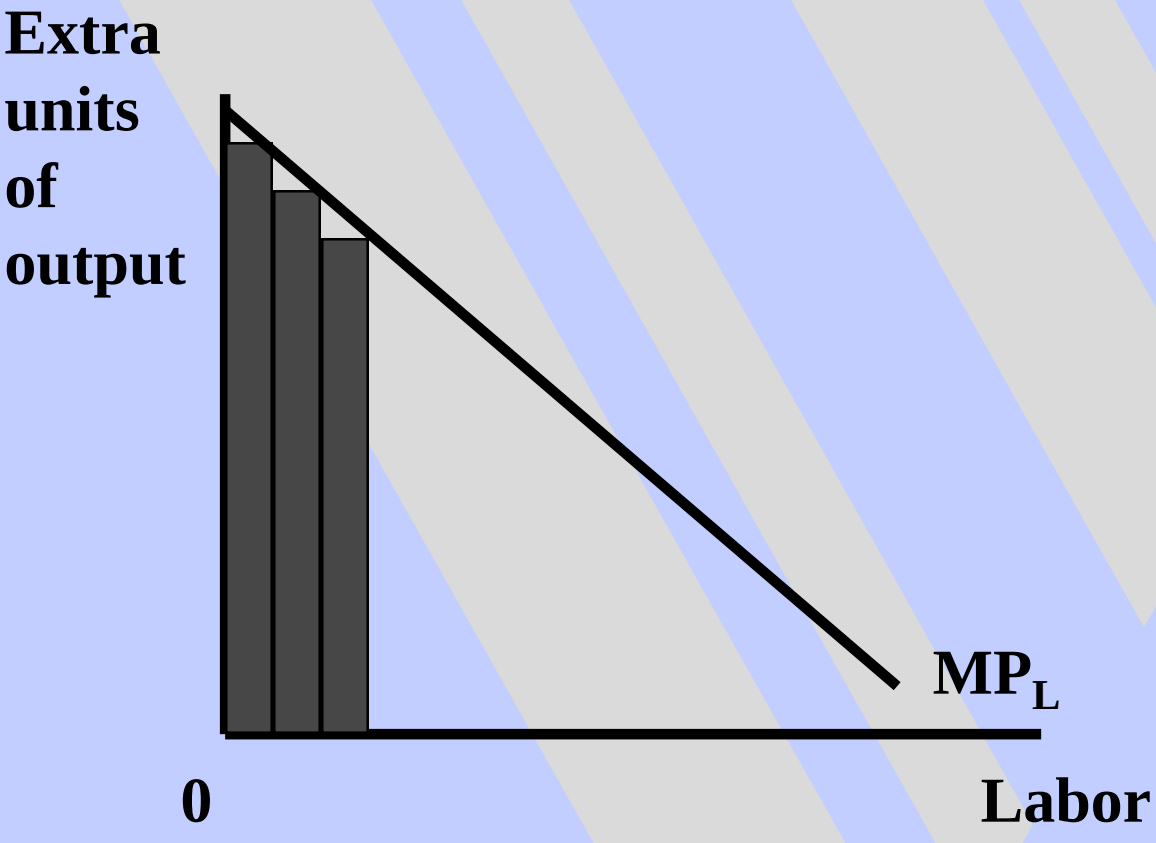
Version 1

Each incremental unit of labor adds to output but at a diminishing rate...



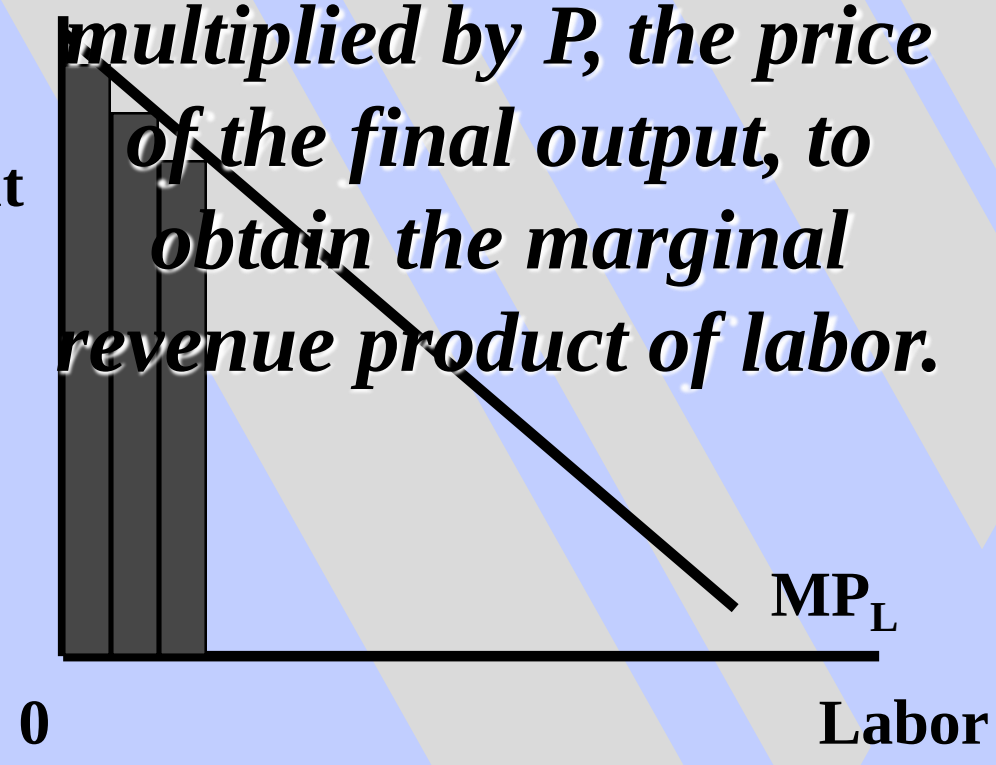
Version 1

…producing the marginal product of labor curve



Version 1

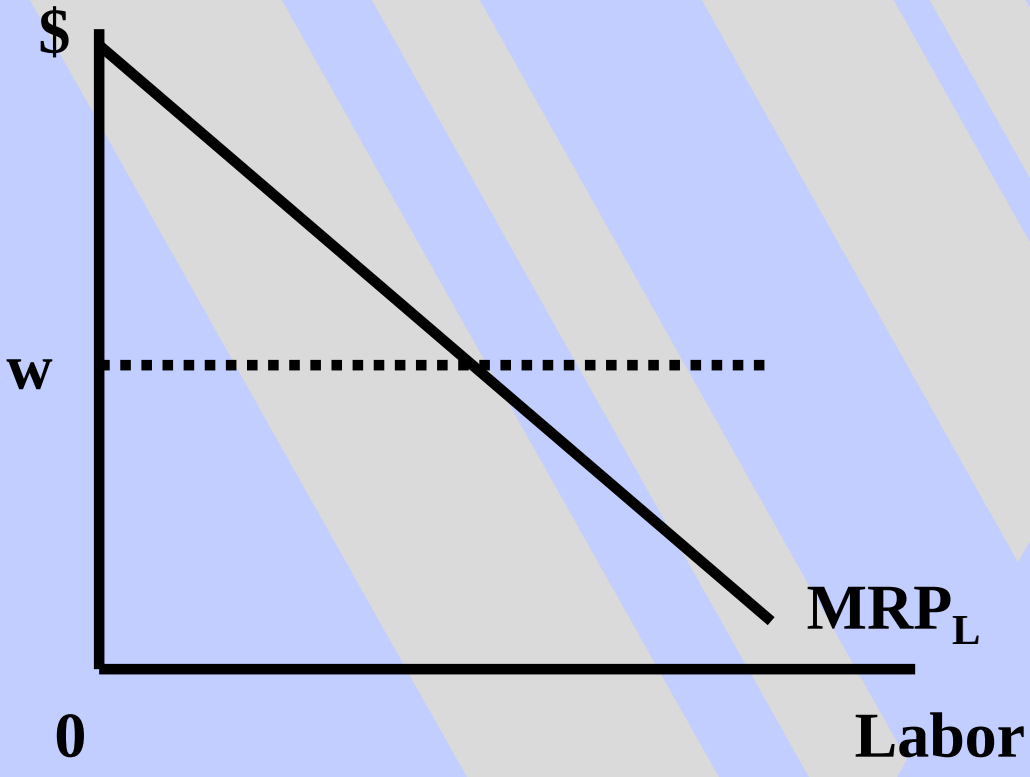
Under competitive conditions, the marginal product of labor can be multiplied by P, the price of the final output, to obtain the marginal revenue product of labor.



$$MRP_L = MP_L \times P$$

Version 1

$$MRP_L = MP_L \times P$$



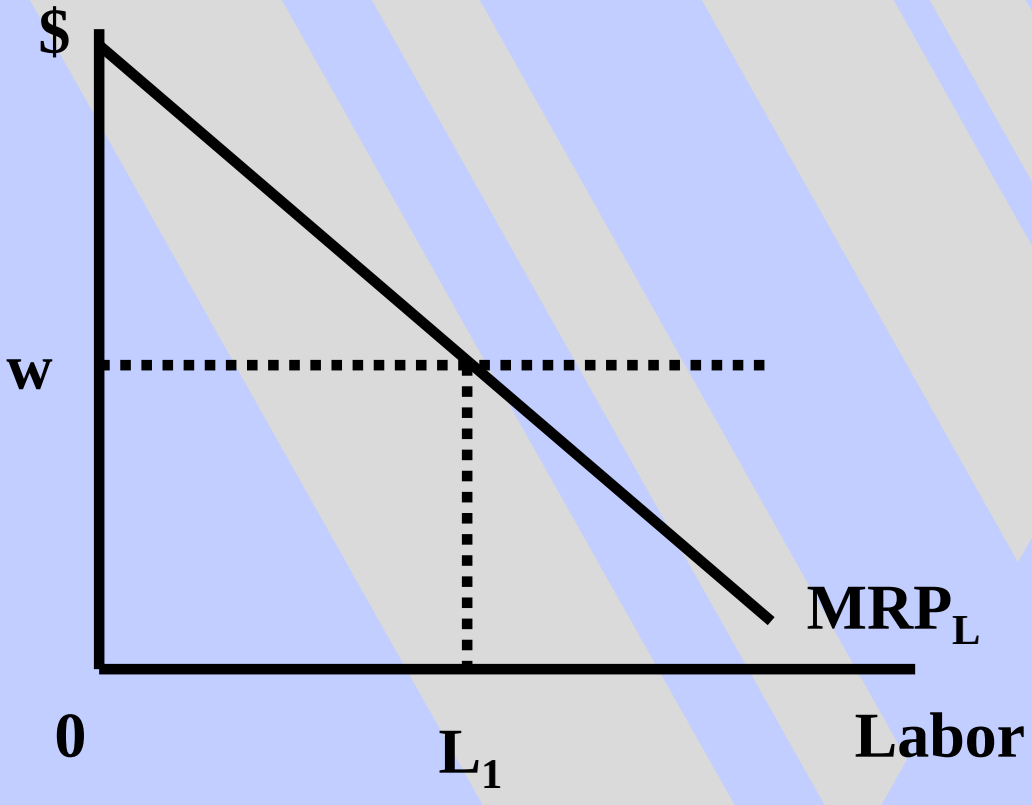
What is profit maximzing rule if market wage = w?

Mitchell's Iron Law of Economics

Whenever you are asked a question about a diagram with two lines, the answer is either "*where they cross*" or "*where they are tangent*."

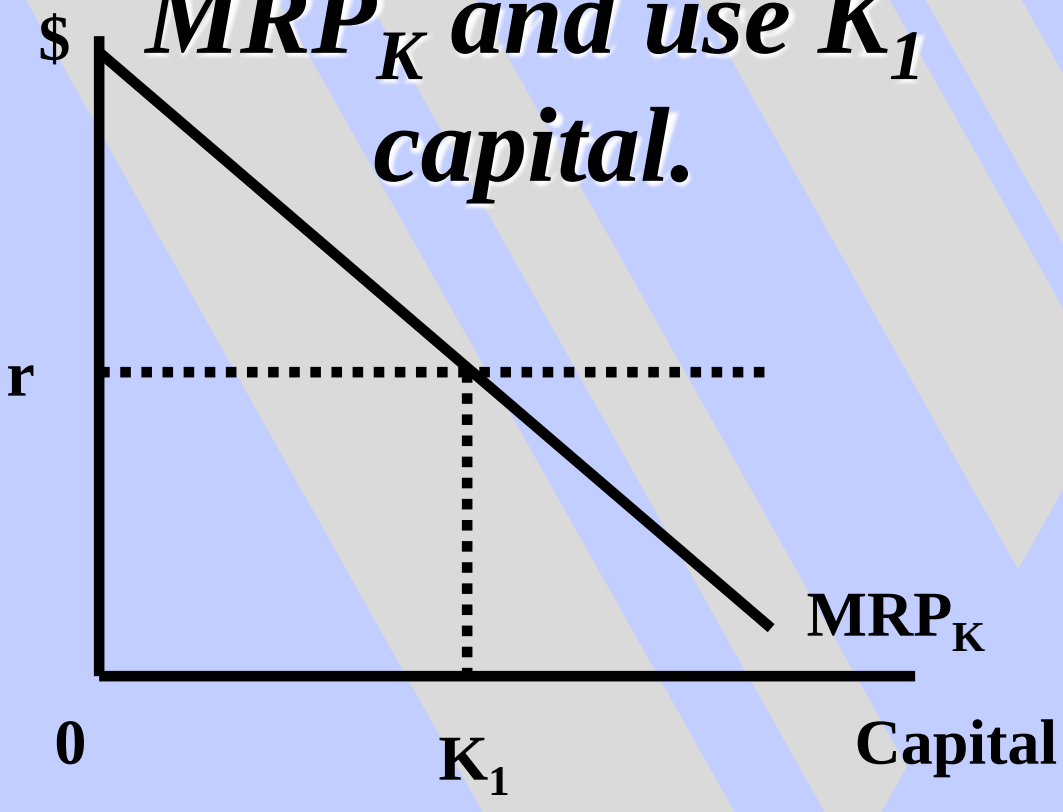
Version 1

Set $w = MRP_L$ and use L_1 labor.



Version 1

Same is true for capital. Set r = MRP_K and use K_1 capital.



First Proof

$$w = MRP_L = MP_L \times P$$

$$r = MRP_K = MP_K \times P$$

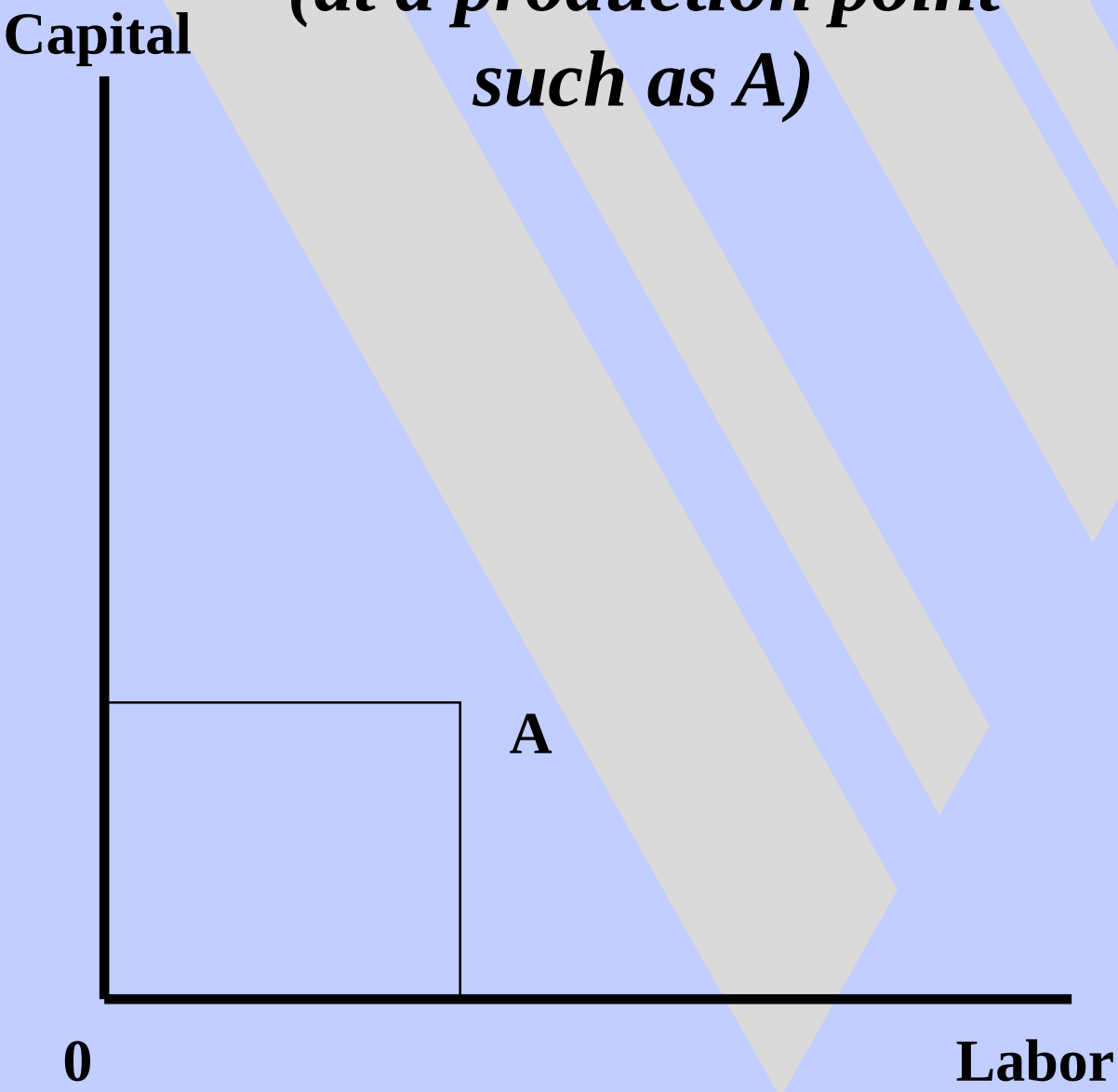
Therefore:

$$w/r = MP_L/MP_K$$

Q.E.D •

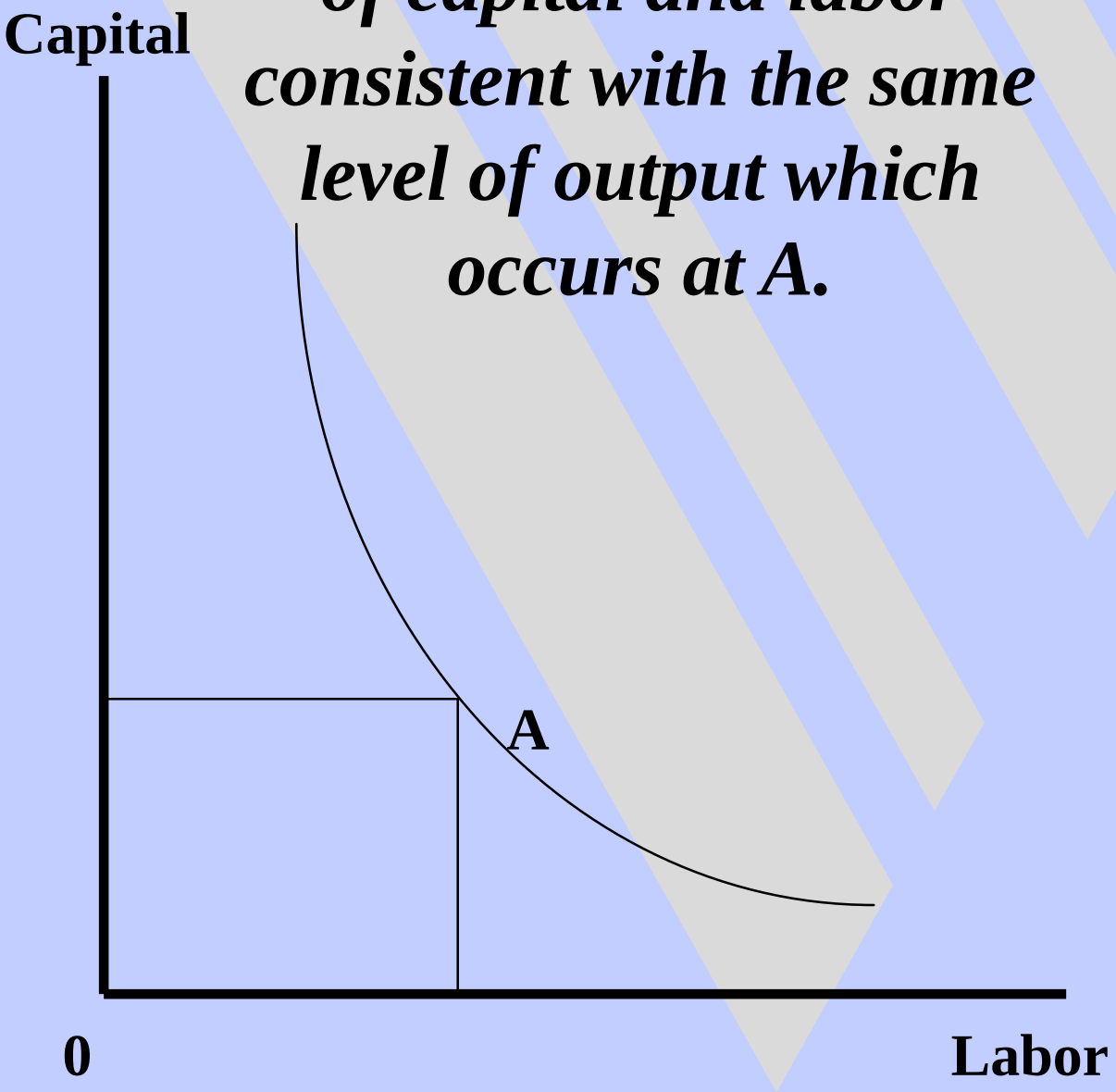
Version 2

Considering substitution between capital and labor (at a production point such as A)



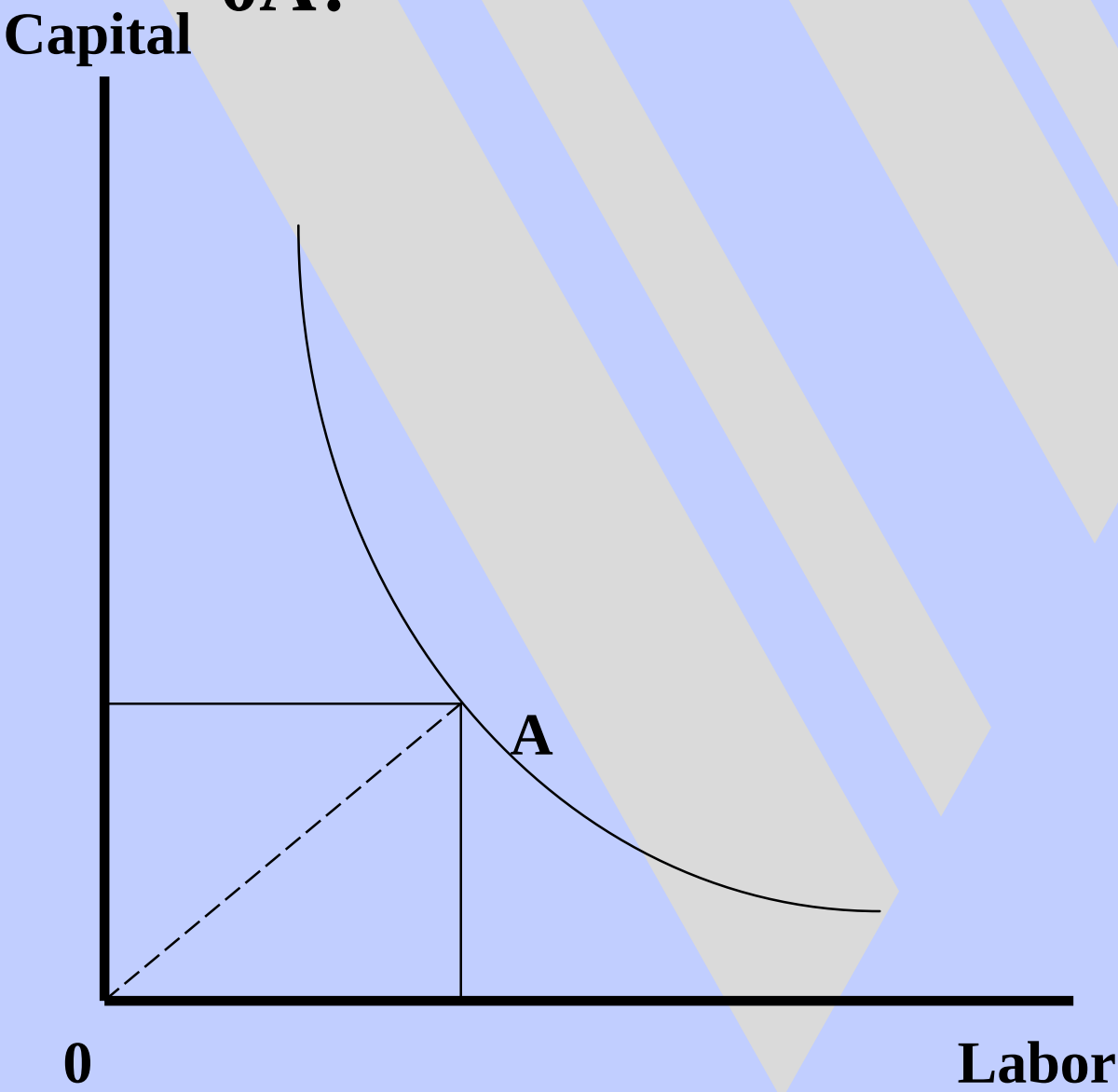
Version 2

The isoquant through point A shows all combinations of capital and labor consistent with the same level of output which occurs at A.



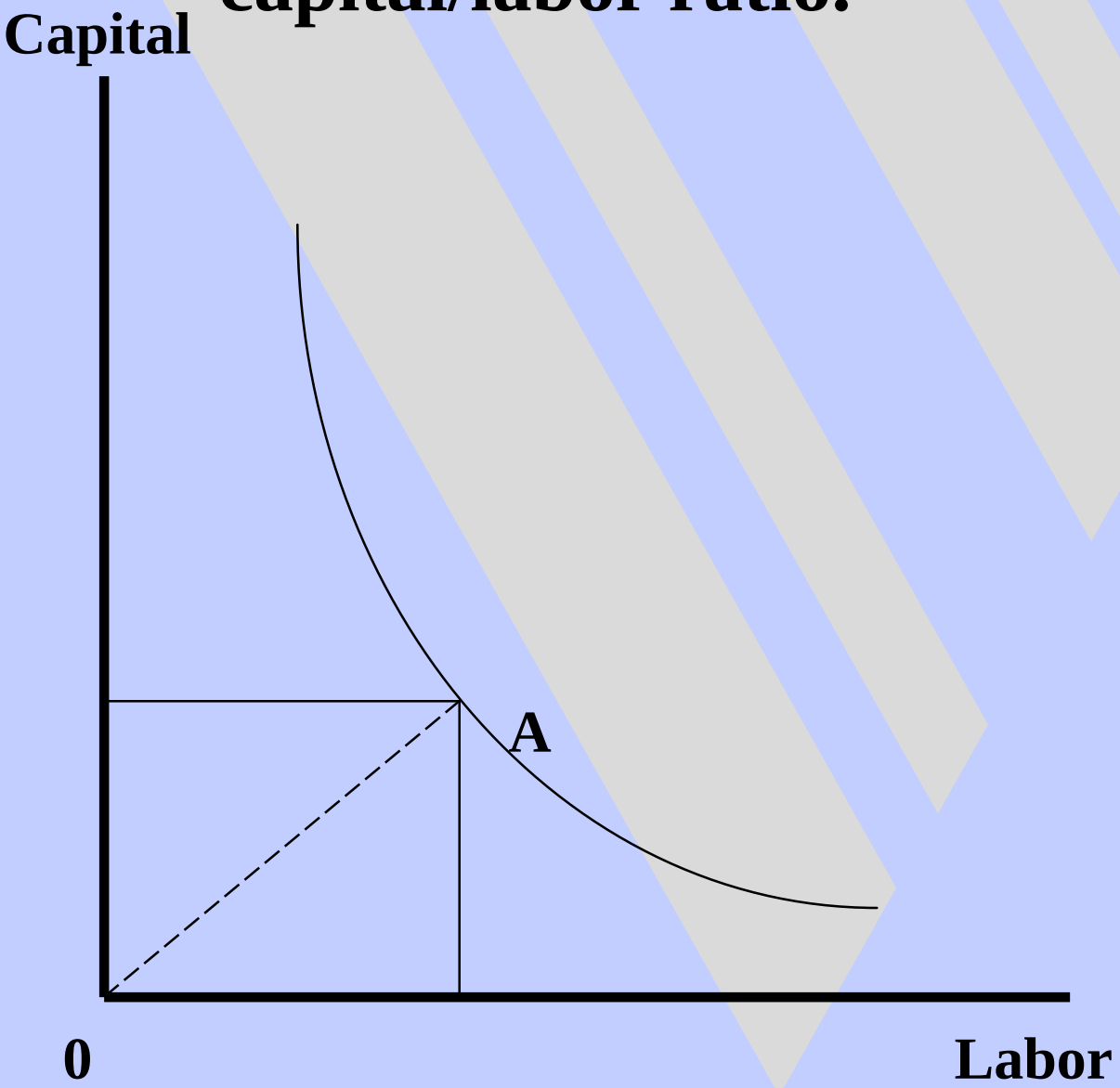
Version 2

<u>Question</u>: How do we interpret line segment 0A?



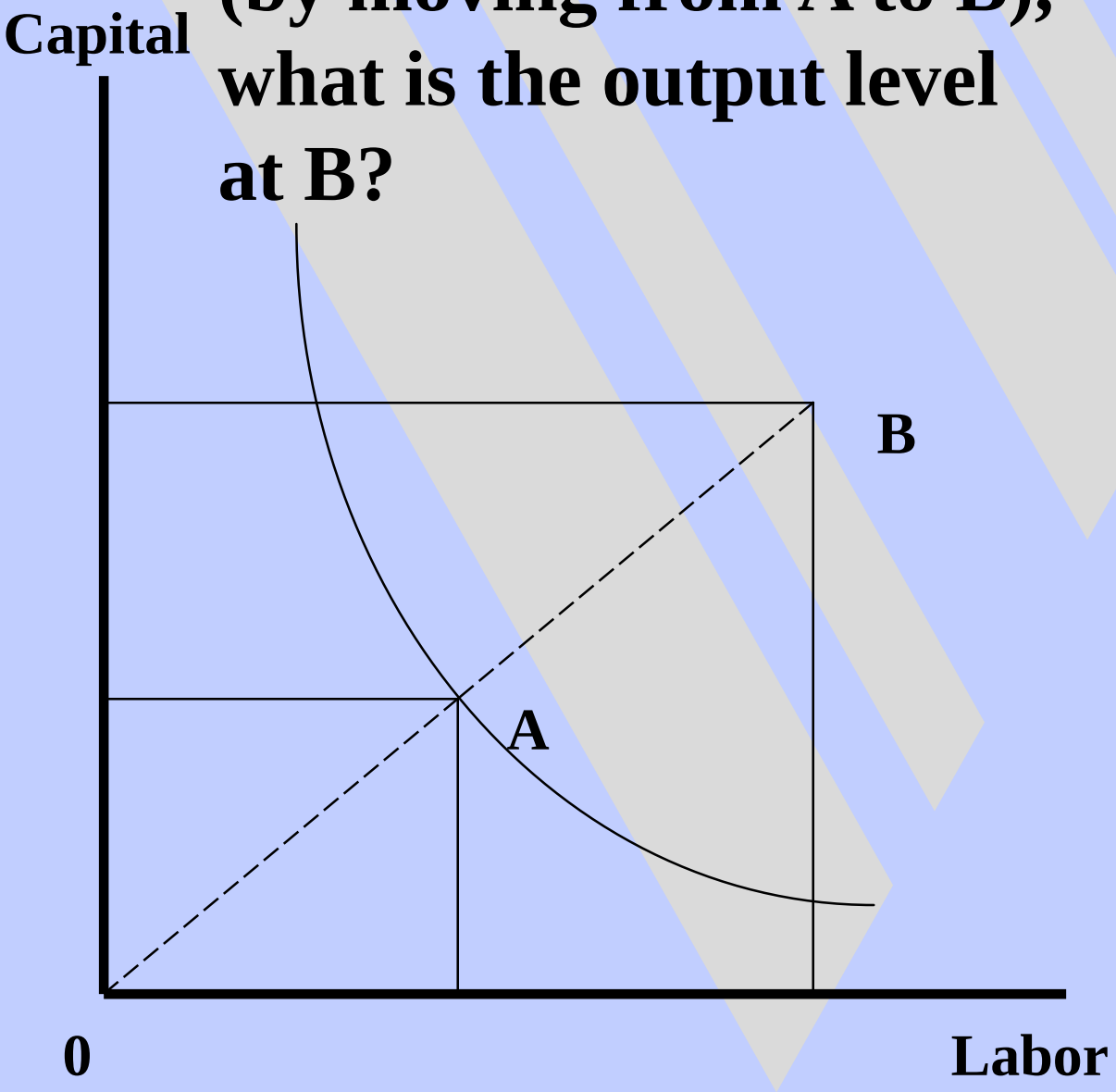
Version 2

<u>Answer</u>: The slope of line segment 0A is the capital/labor ratio.



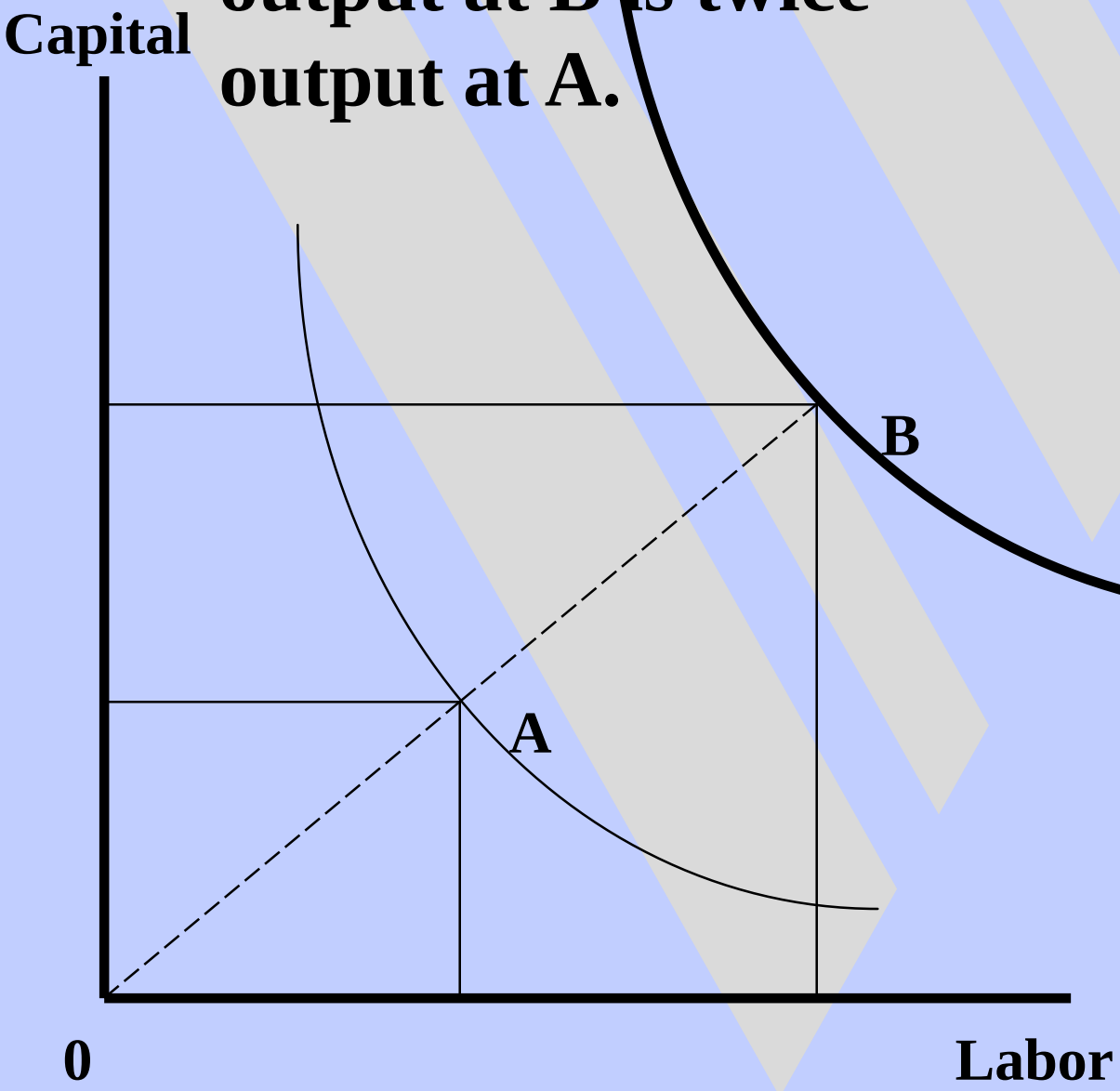
Version 2

<u>Question</u>: If we double capital and labor inputs (by moving from A to B), what is the output level at B?



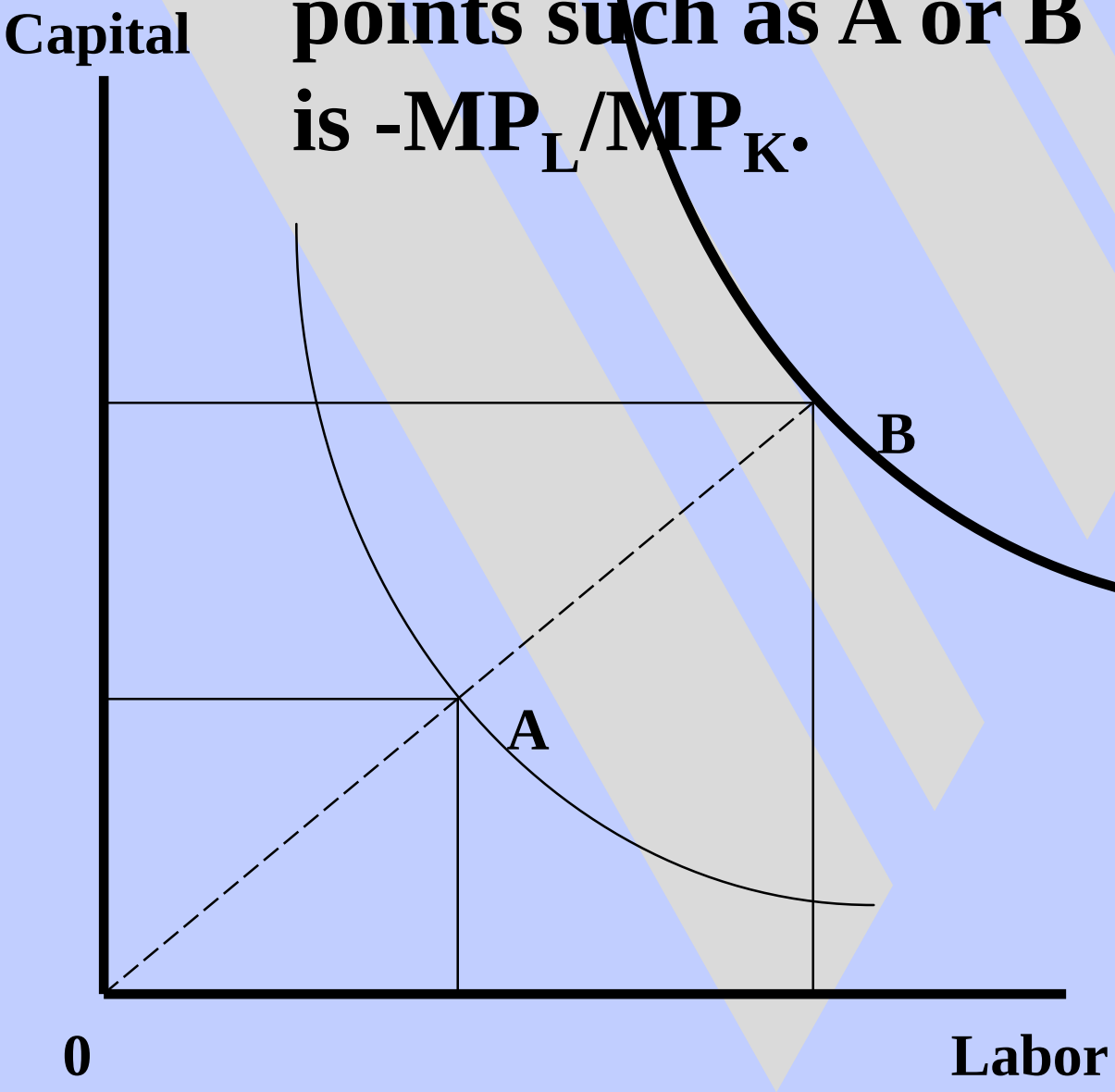
Version 2

<u>Answer</u>: With assumed constant returns to scale, output at B is twice output at A.



Version 2

<u>Assertion</u>: The slope of the isoquants at points such as A or B is $-MP_L/MP_K$.



Consider production manager given budget E' to expend on capital (*price* = *r*) and labor (*price* = *w*).

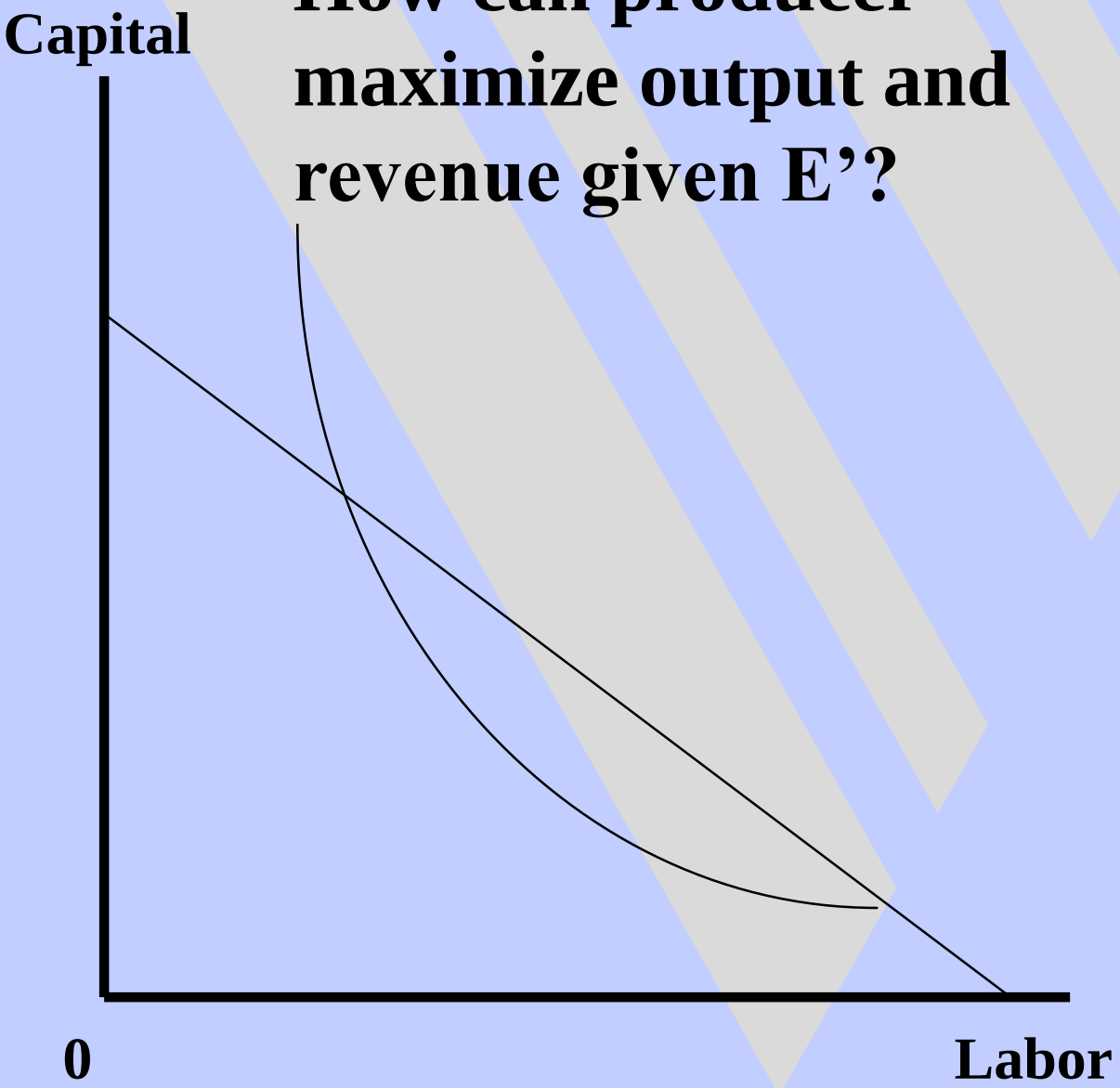
$$E' = wL + rK$$

or

$$K = (E'/r) - (w/r)L$$

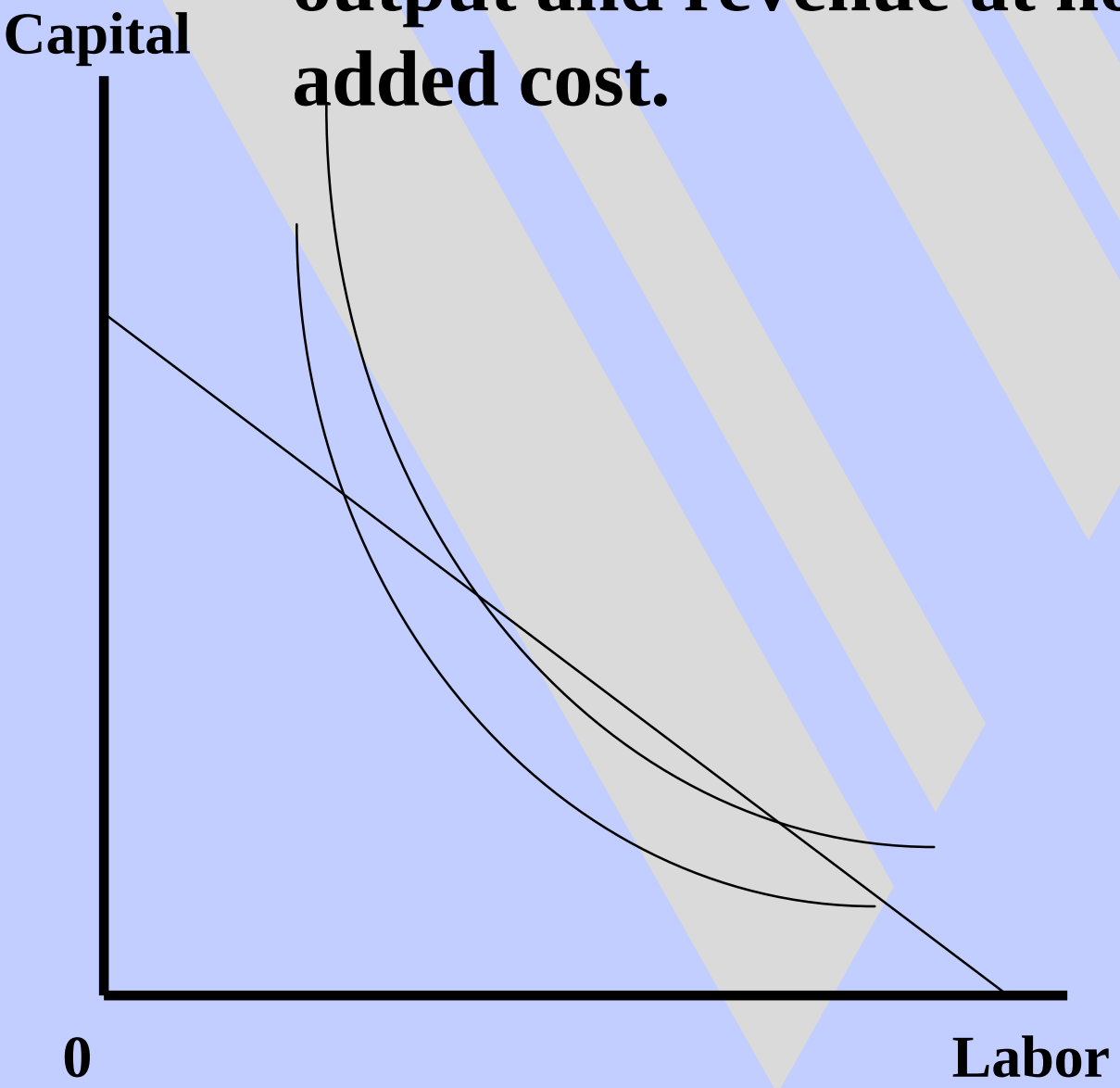
Version 2

Straight line represents budget constraint E'. How can producer maximize output and revenue given E''?



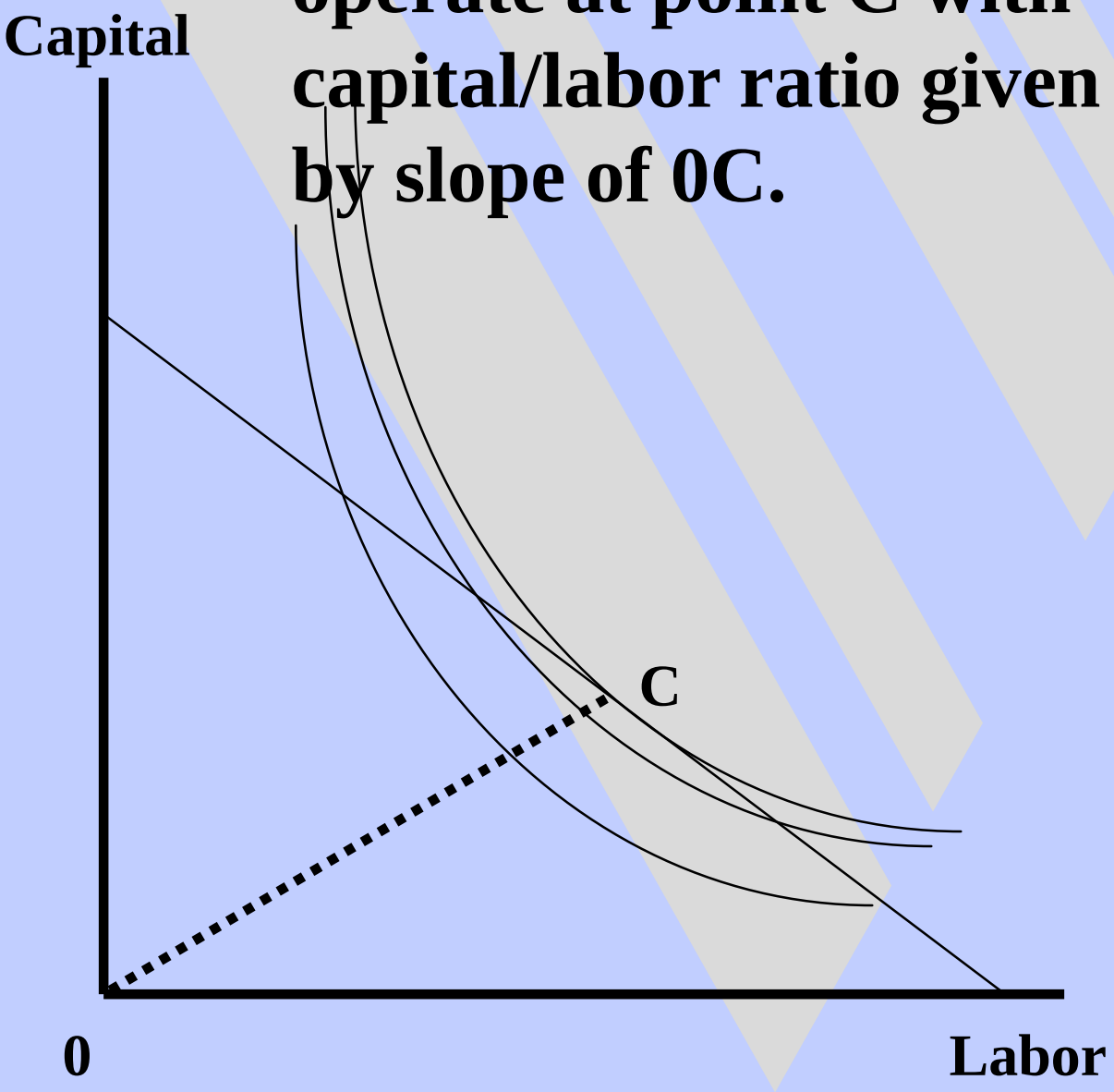
Version 2

Moving to a higher isoquant increases output and revenue at no added cost.



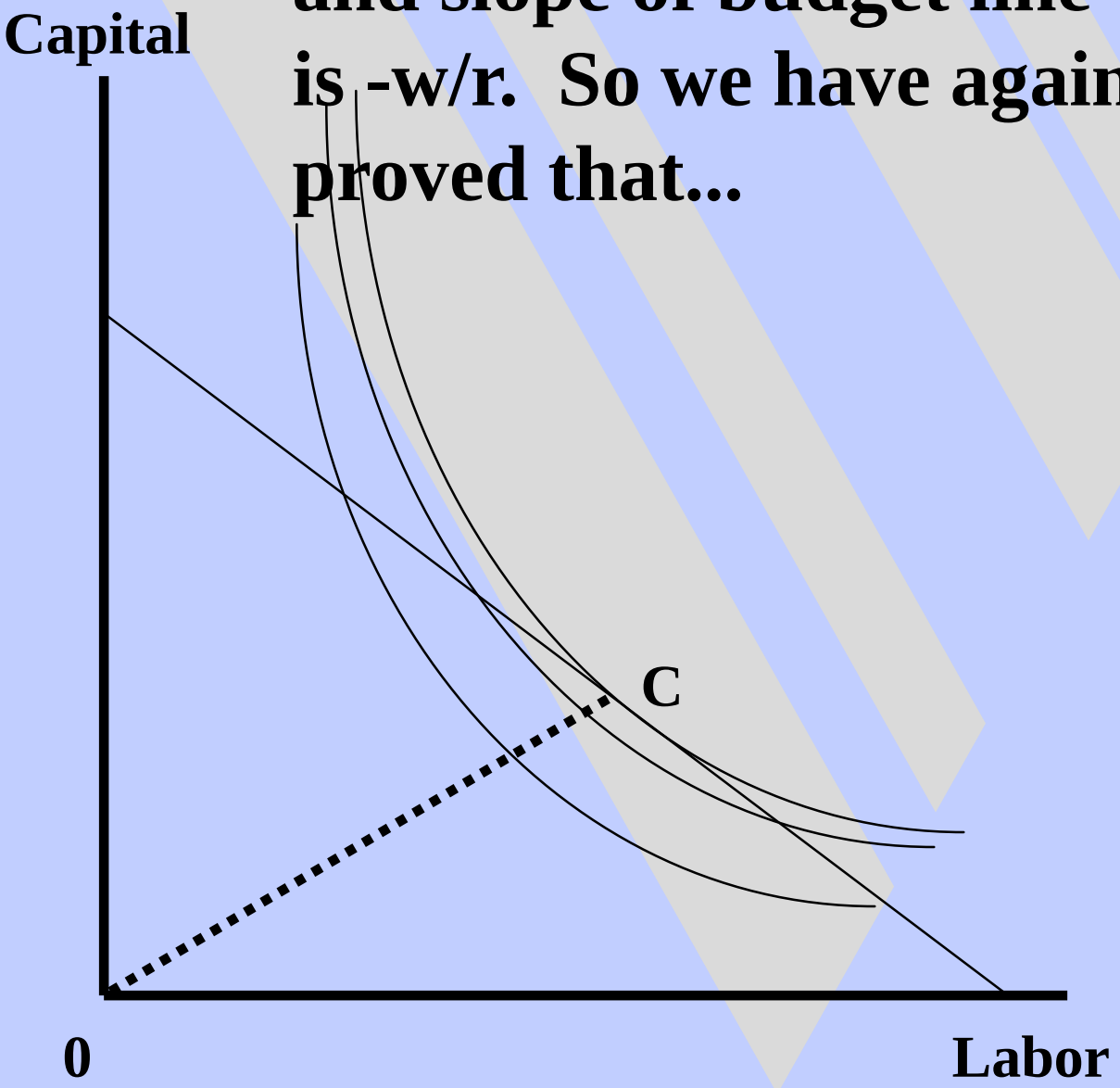
Version 2

Solution is to get to highest isoquant (tangency) and operate at point C with capital/labor ratio given by slope of 0C.



Version 2

Note that at C, slope of isoquant is $-MP_L/MP_K$ and slope of budget line is -w/r. So we have again proved that...



The wage/rental ratio (w/r) =

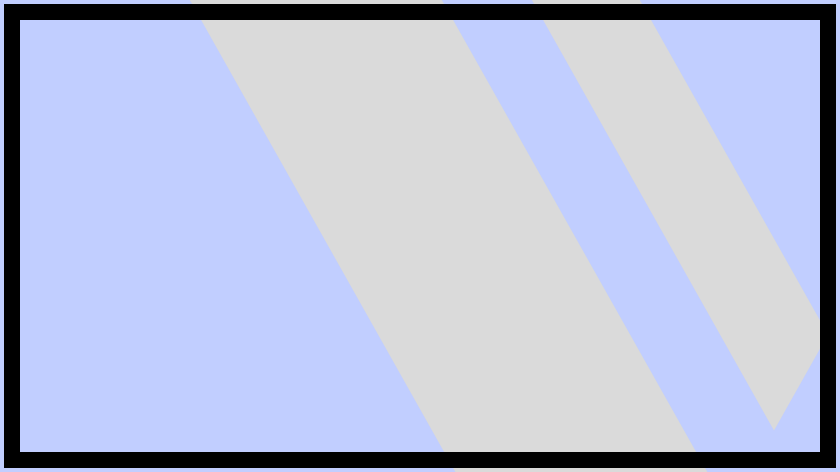
the ratio of the marginal product of labor to the marginal product of capital

(MP_L/MP_K)

which was what we got via Version 1!!!

Task: Assume 2 industries and construct the production possibilities curve.

The first thing we need is an *Edgeworth box*.



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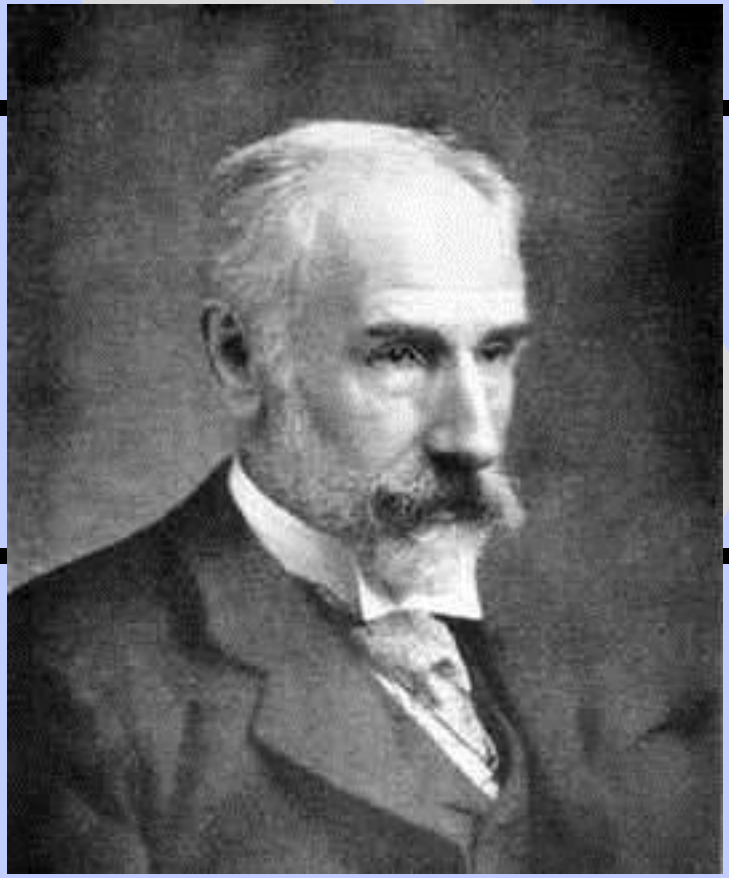
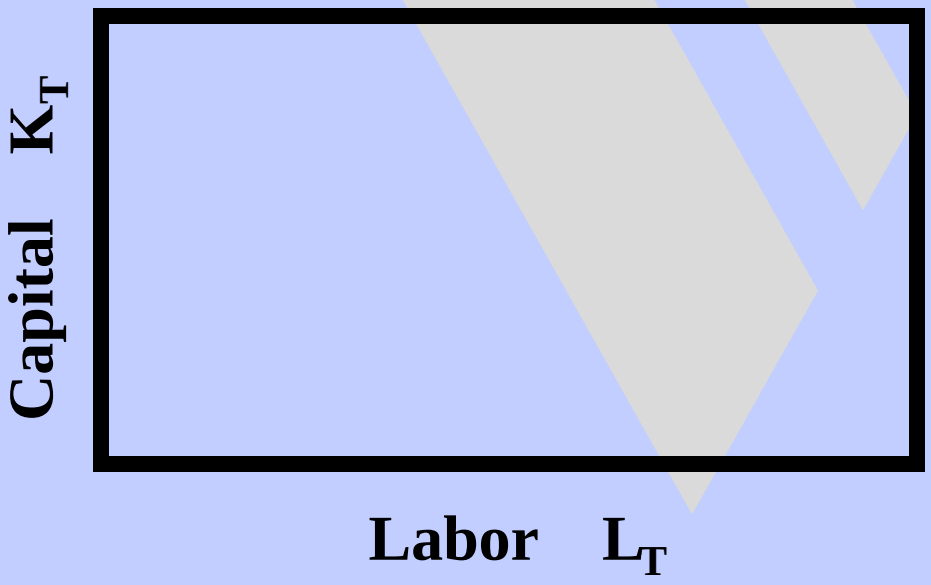


Francis Edgeworth: 1845-1926

Task: Assume 2 industries and construct the production possibilities curve.

Total capital available to the economy is represented by the height of the box (K_T) and total labor is represented by the length of the box (L_T).



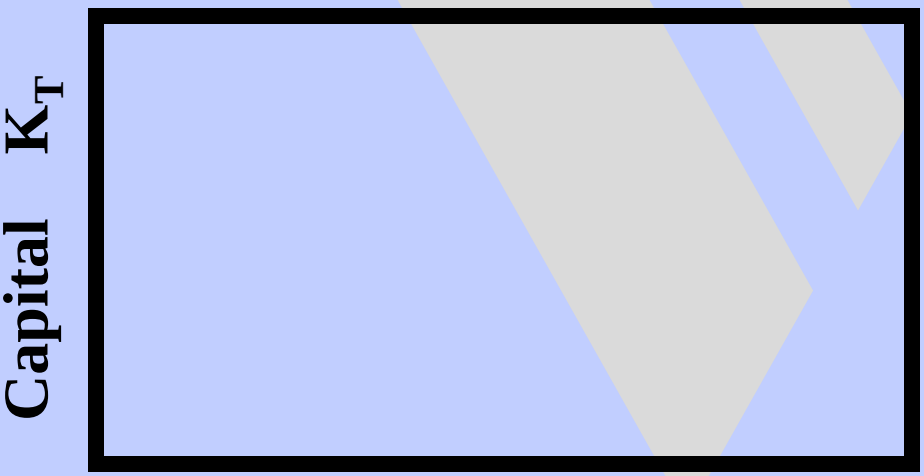
Task: Assume 2 industries and construct the production possibilities curve.

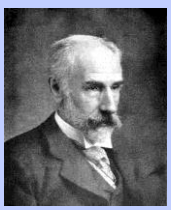
Let 0_1 represent the origin for industry 1 and 0_2 represent the origin (inverted) for industry 2.

Let $L_T = L_1 + L_2$

and $K_T = K_1 + K_2$

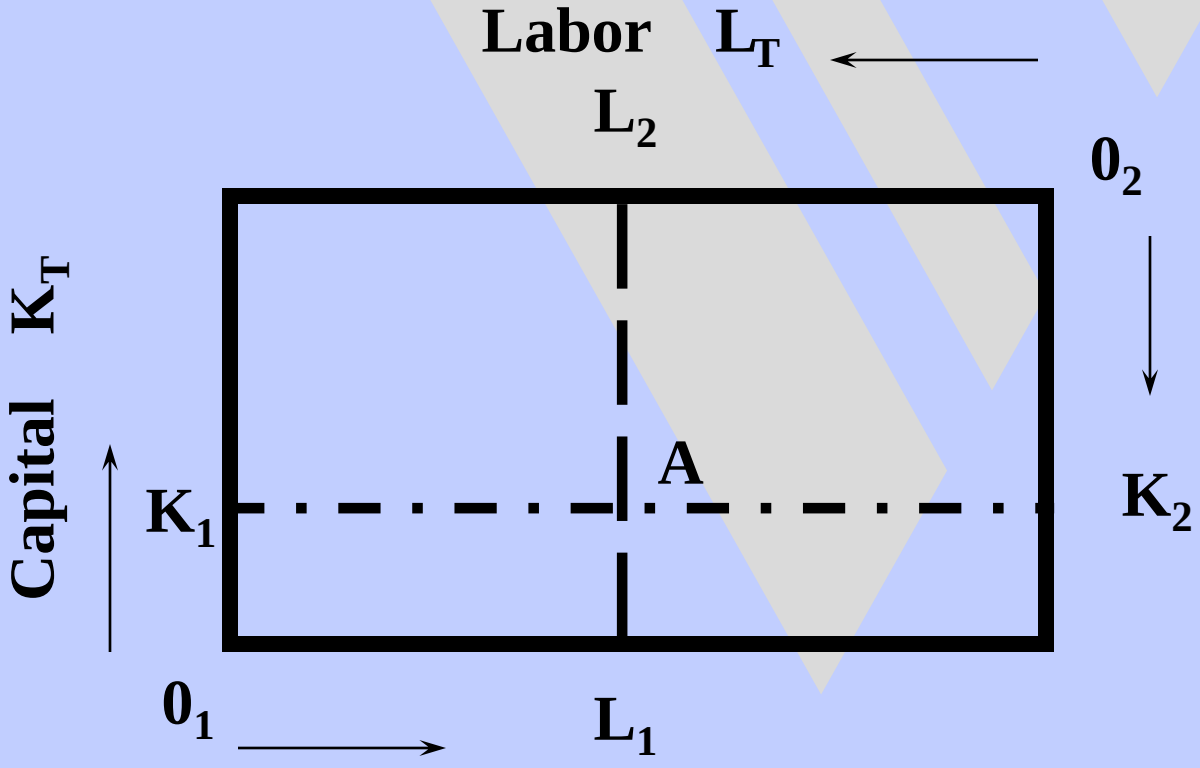
0_2

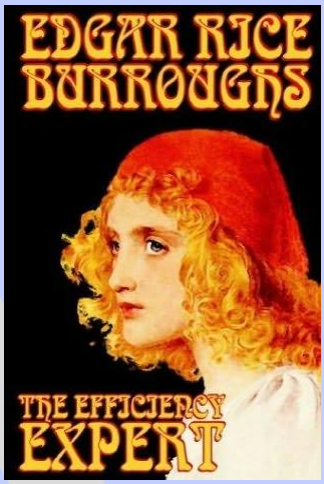




Task: Assume 2 industries and construct the production possibilities curve.

Any production point (such as "A") can be represented by a point within the box. At "A", industry 1 gets K_1 capital and L_1 labor. Industry 2 gets the rest.





Definition:

Production Efficiency

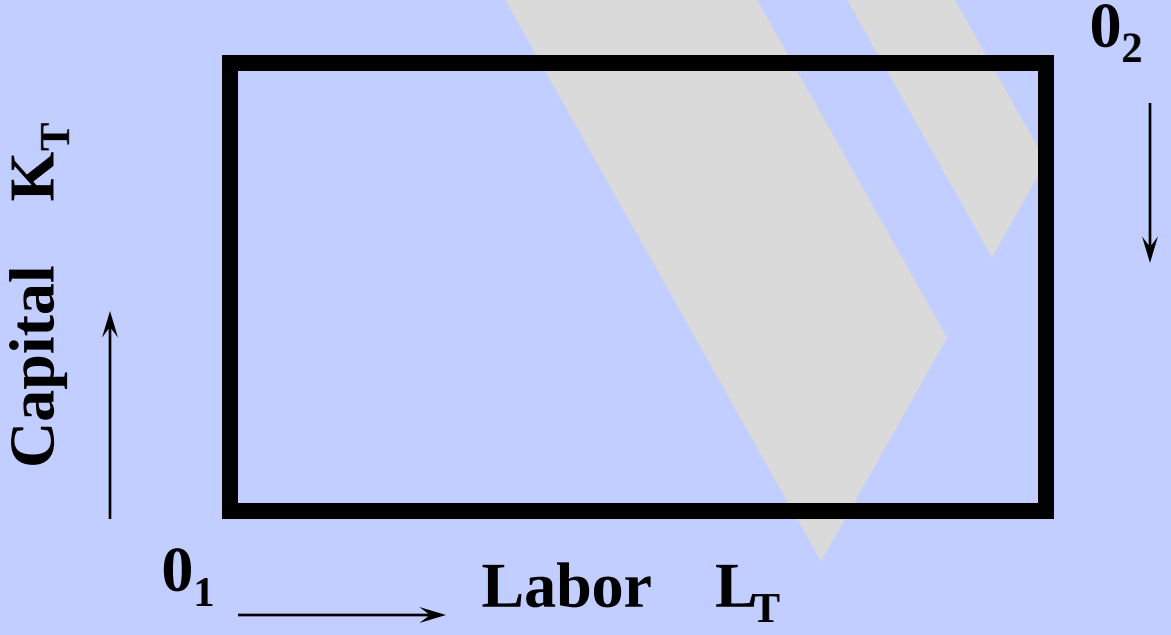
Production efficiency will be increased if it is possible to produce more of one good without sacrificing production of the other.

Task: Assume 2 industries and construct the production possibilities curve.

Two extreme efficiency points can be determined without further analysis:

0_1 and 0_2

Why? What is produced at these two points?



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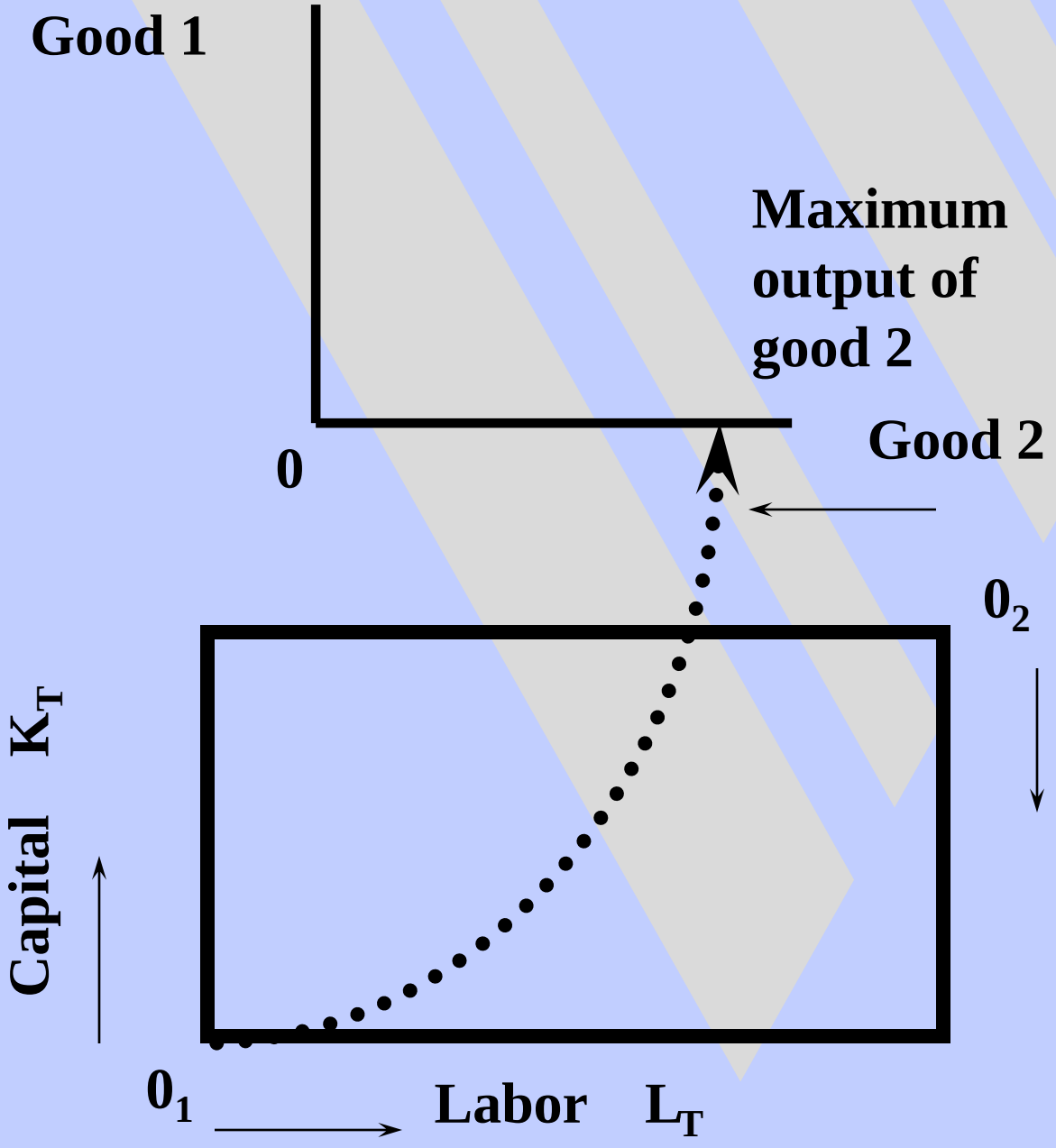
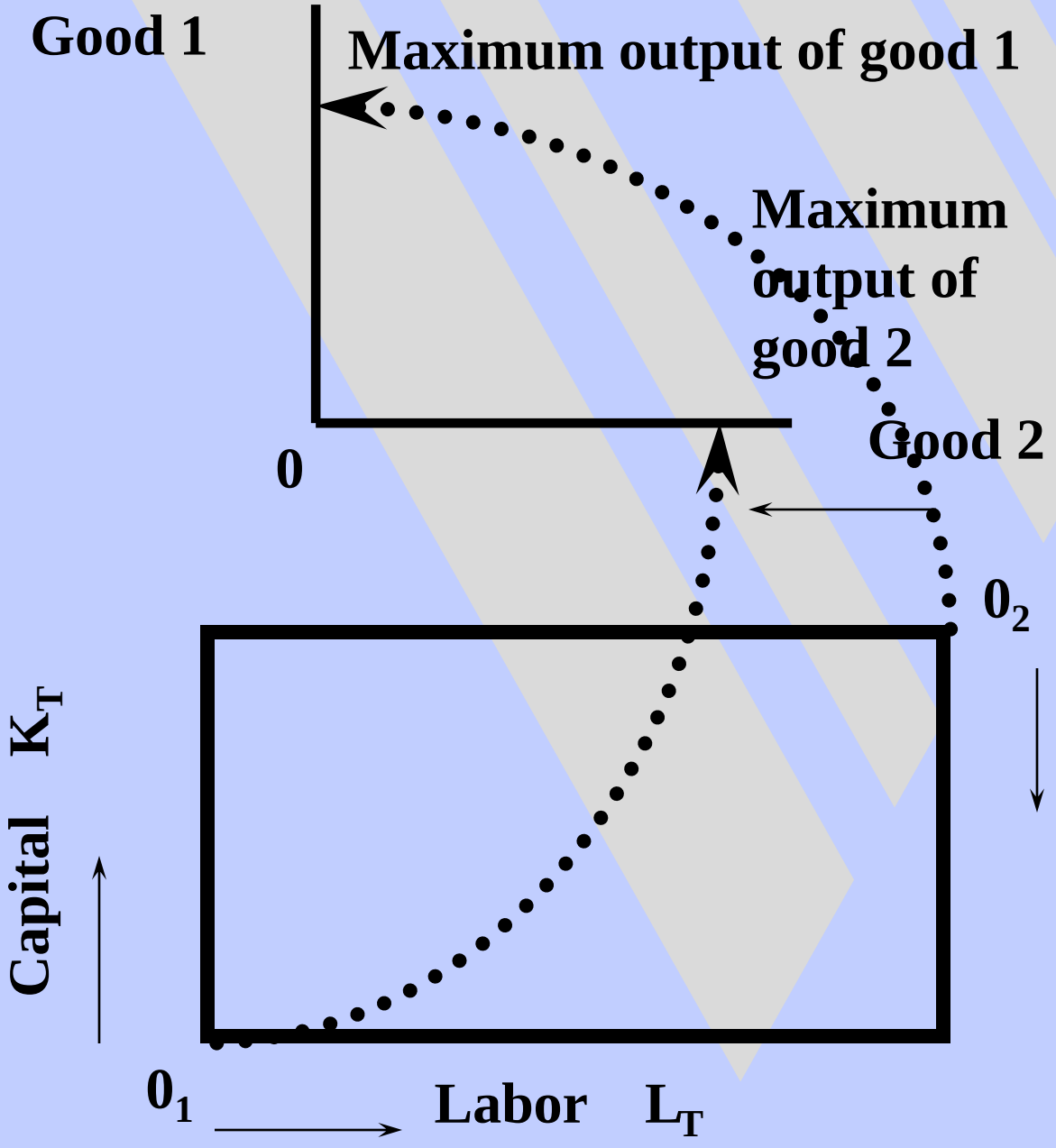
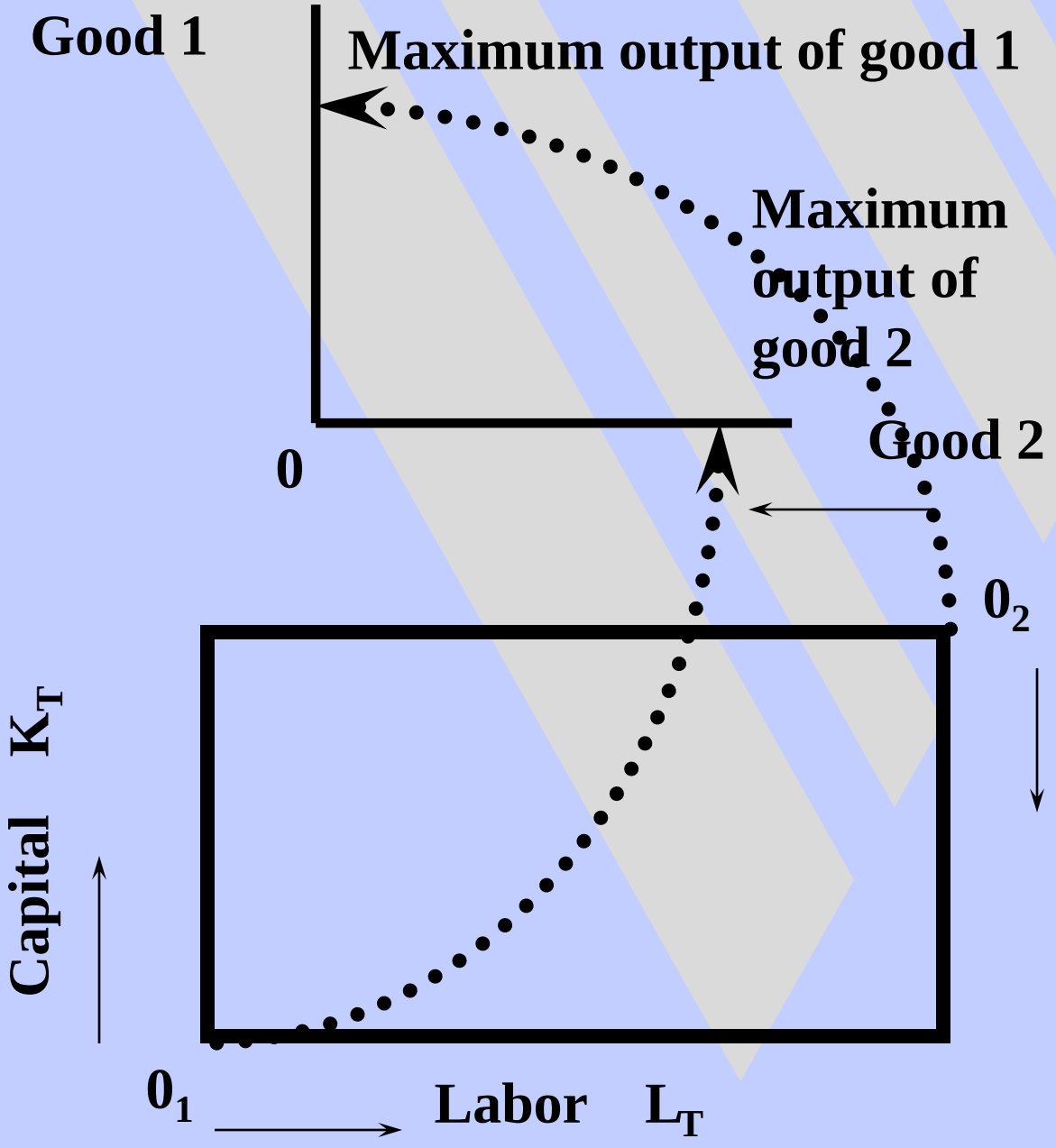


Task: Assume 2 industries and construct the production possibilities curve.



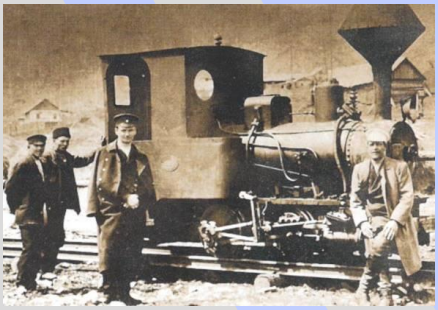
Question: How can we find *efficient* points between 0_1 and 0_2?



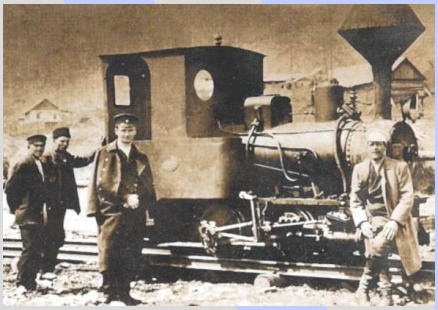
Who is this?

Czar Alexander II

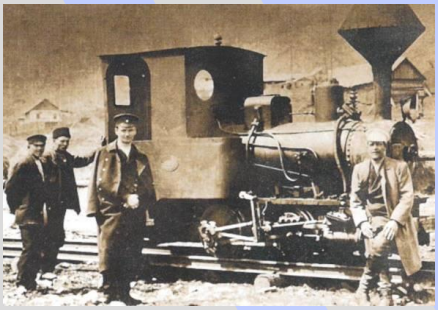
The Russian Railroad "Solution"

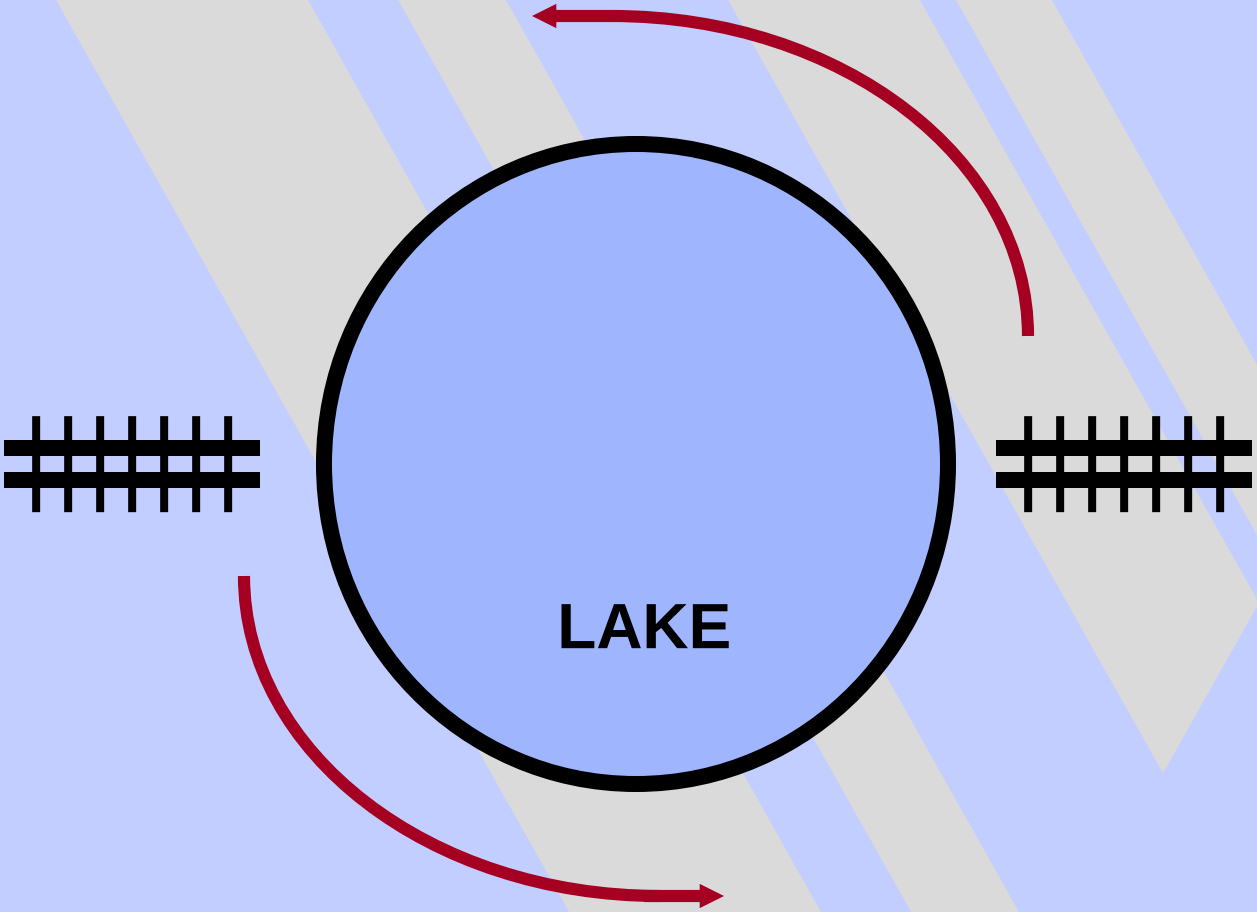


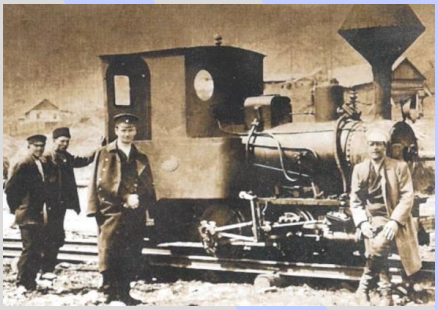
LAKE

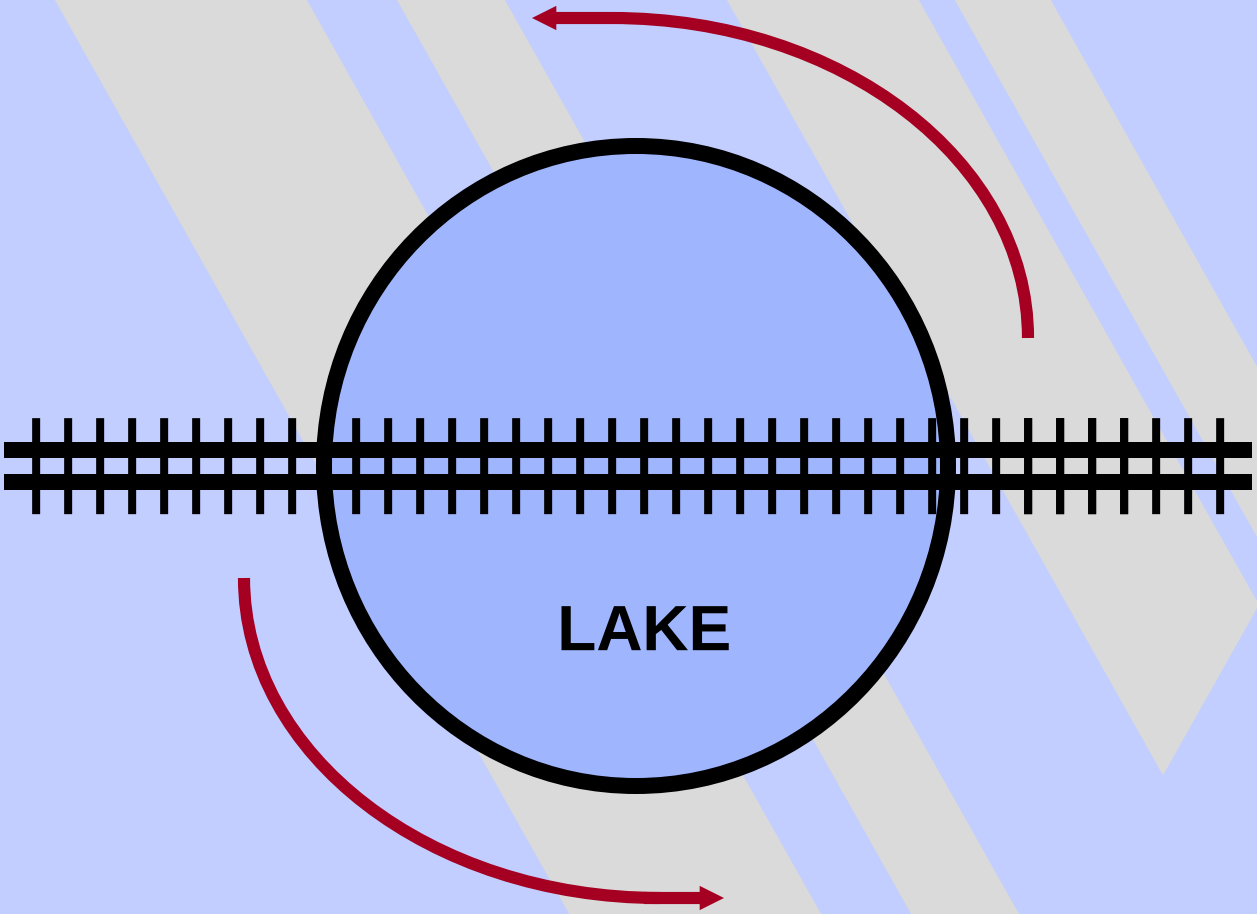


LAKE



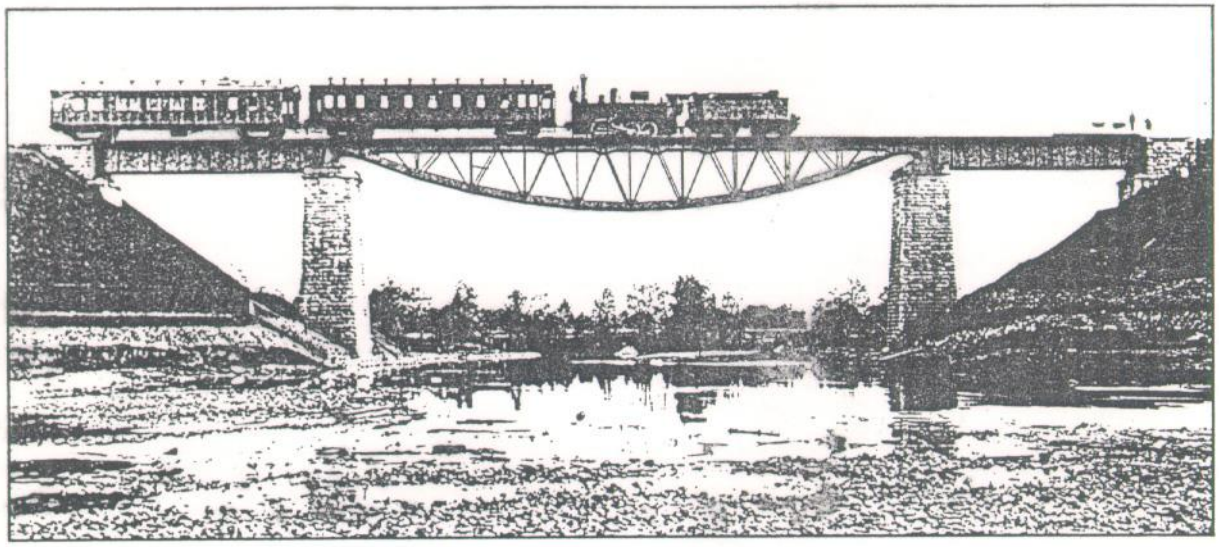

LAKE




LAKE

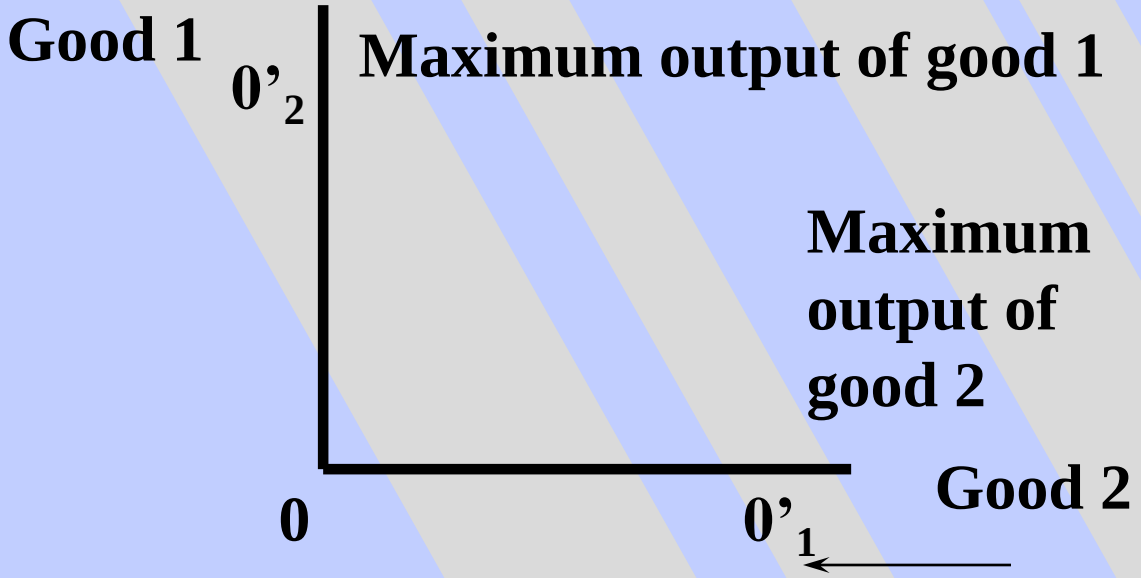
THE TRANS-SIBERIAN RAILWAY

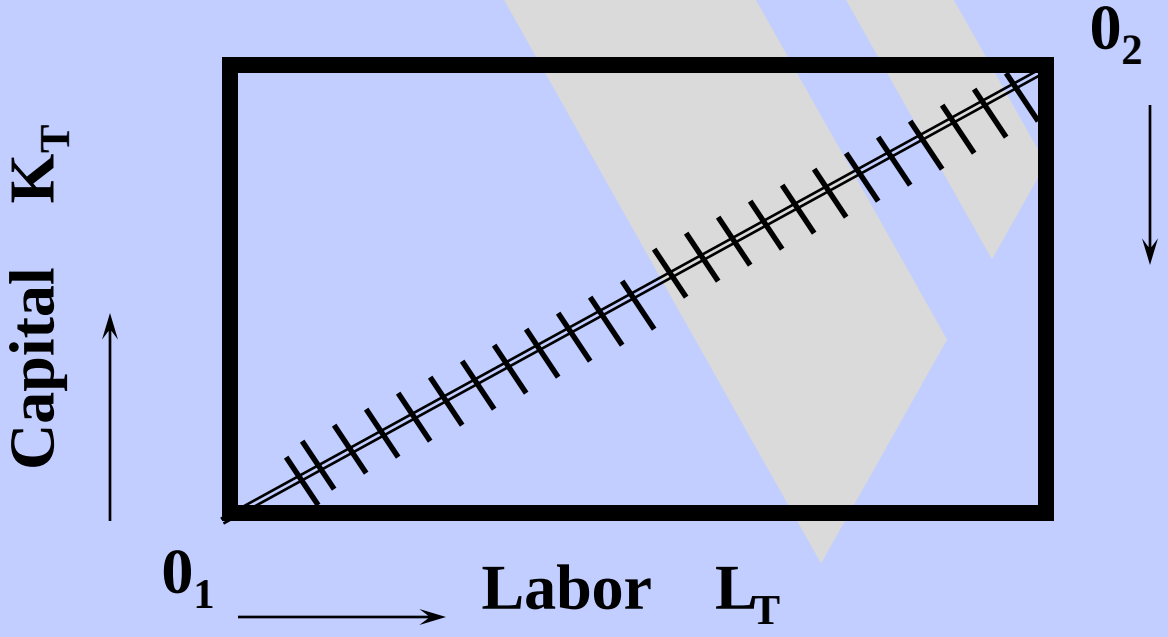
(circa 1910)



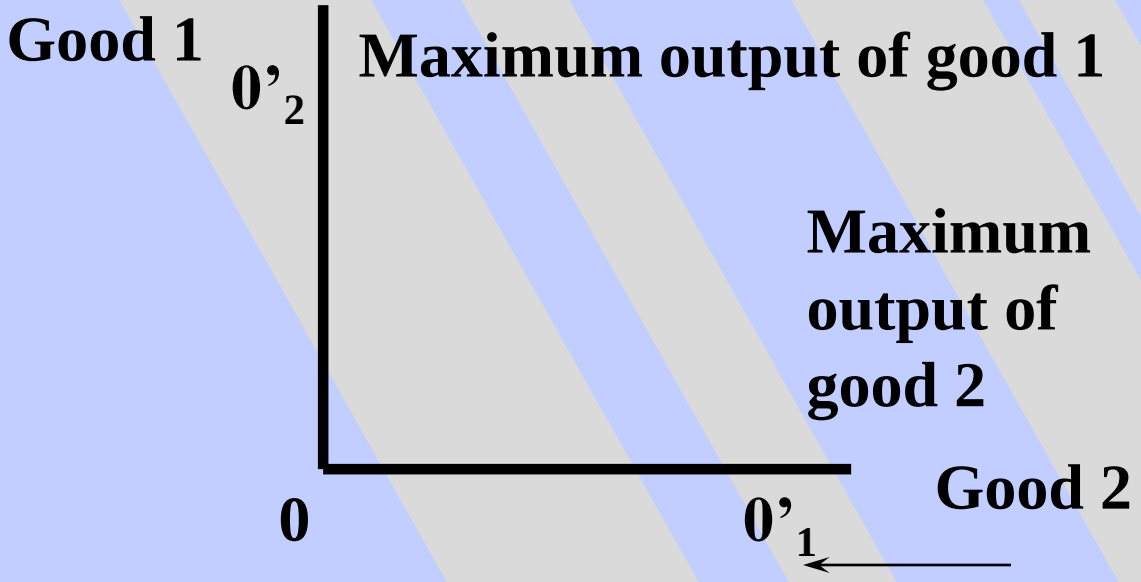
Russian Railroad Solution:

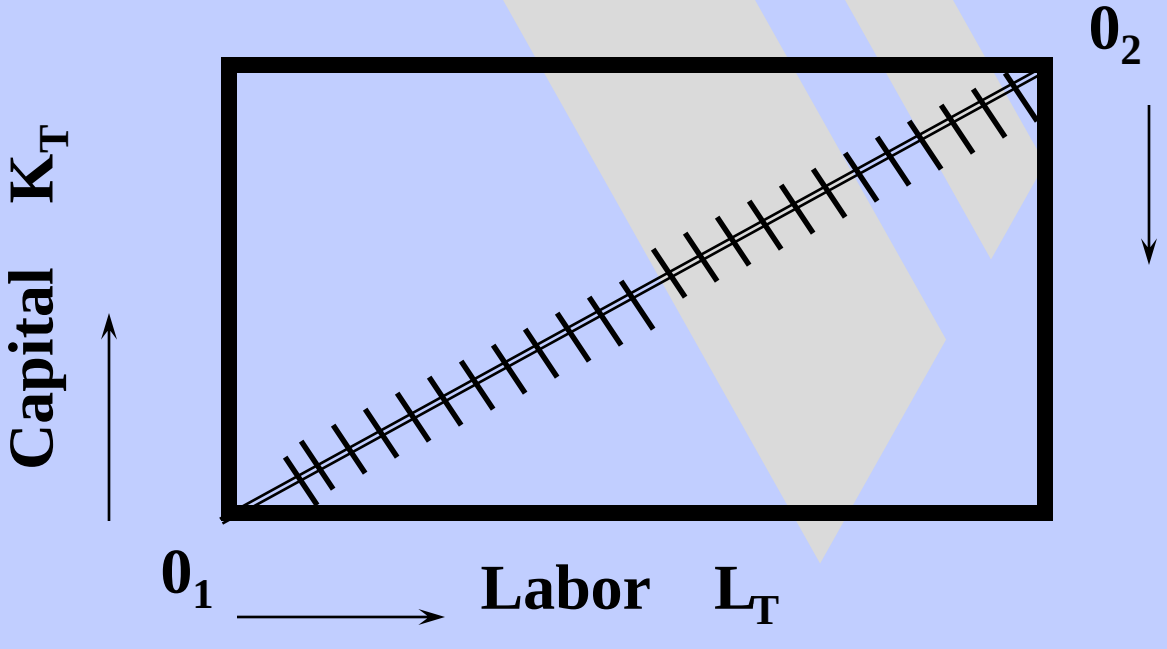
Draw straight line between 0_1 and 0_2?



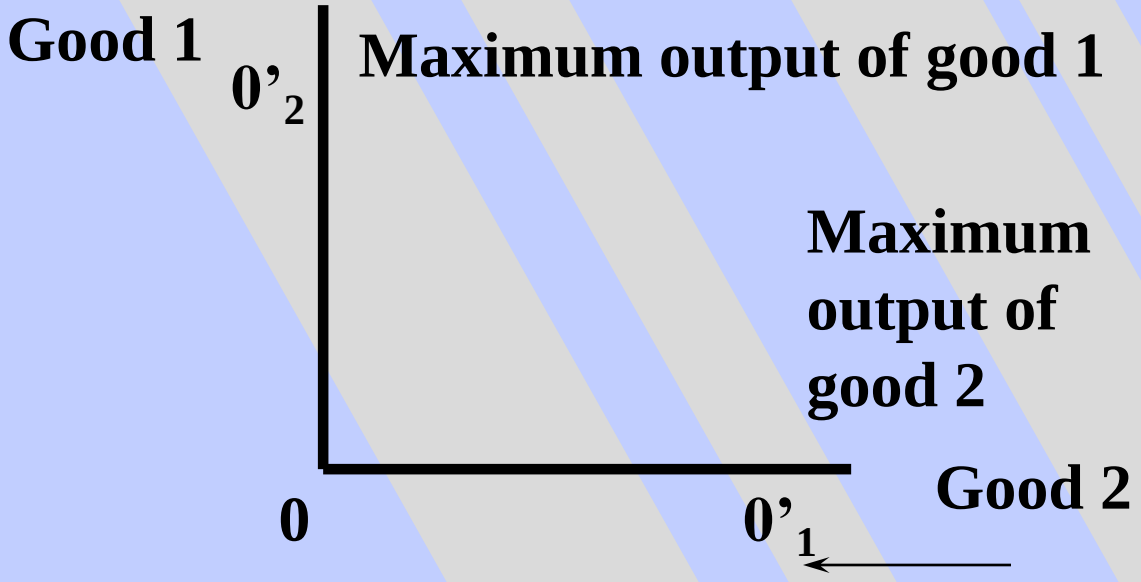


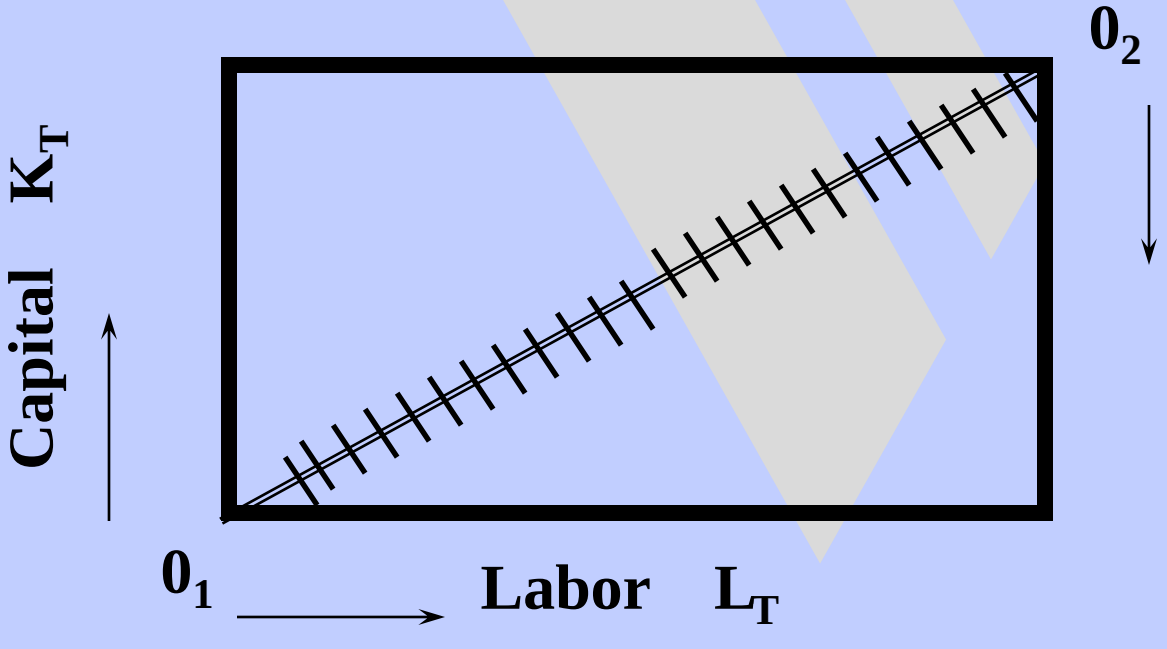
Question: ***What is the capital/labor ratio in industry 1 at any point on the track?***



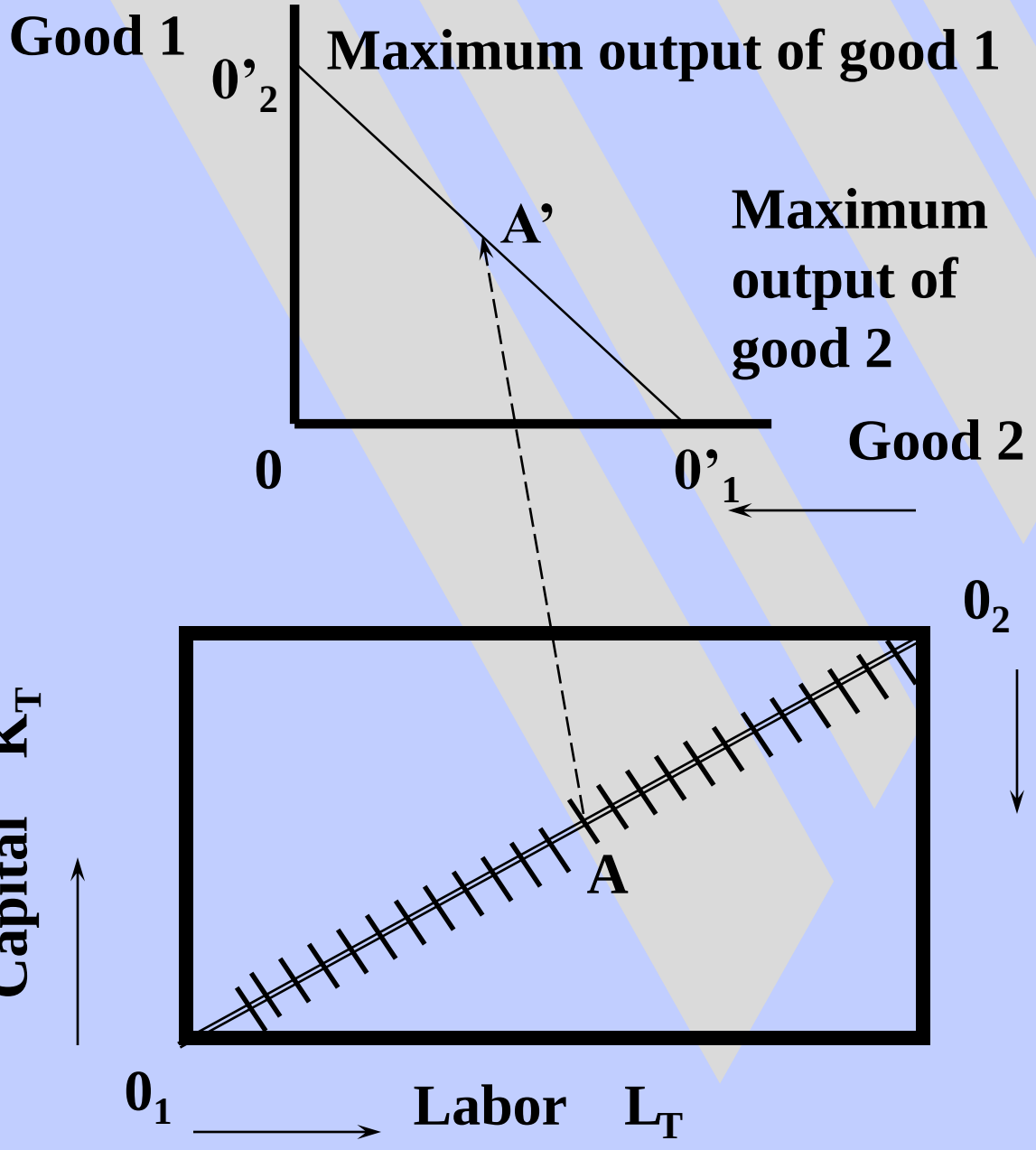


Question: ***What is the capital/labor ratio in industry 2 at any point on the track?***

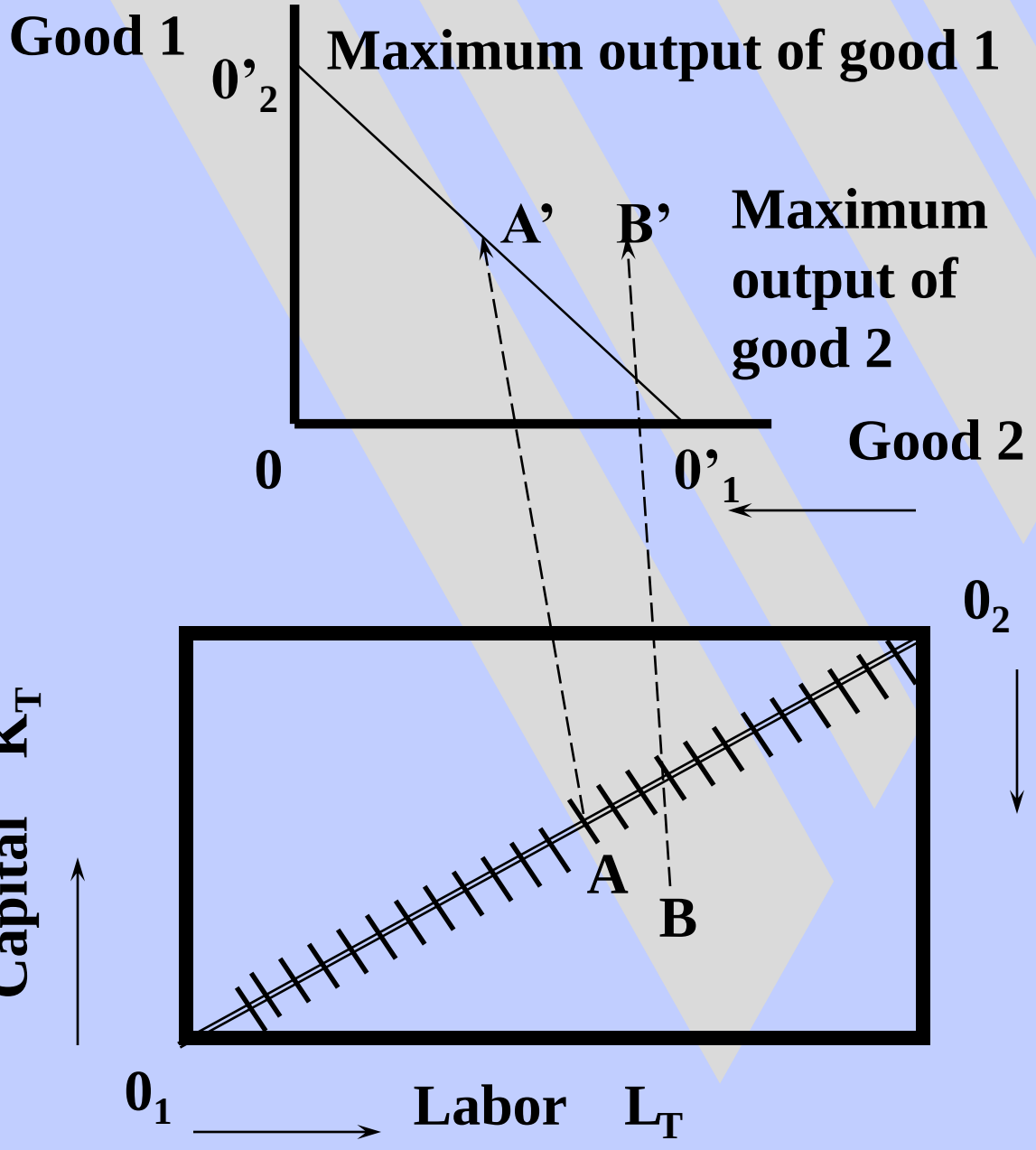




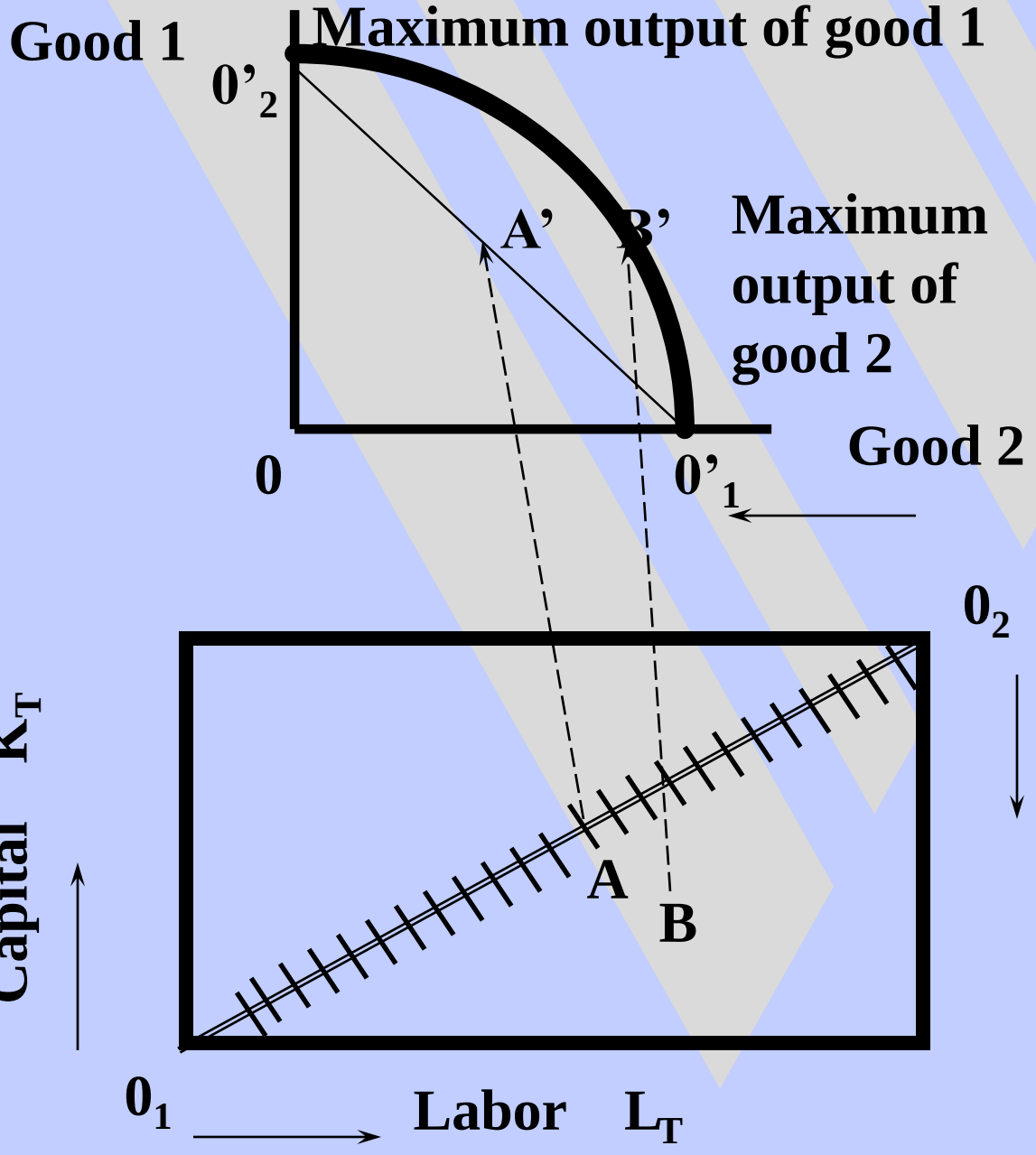
Insight: ***Since fixed bundles of capital and labor are being moved between industries, we are back in the Ricardian world.***



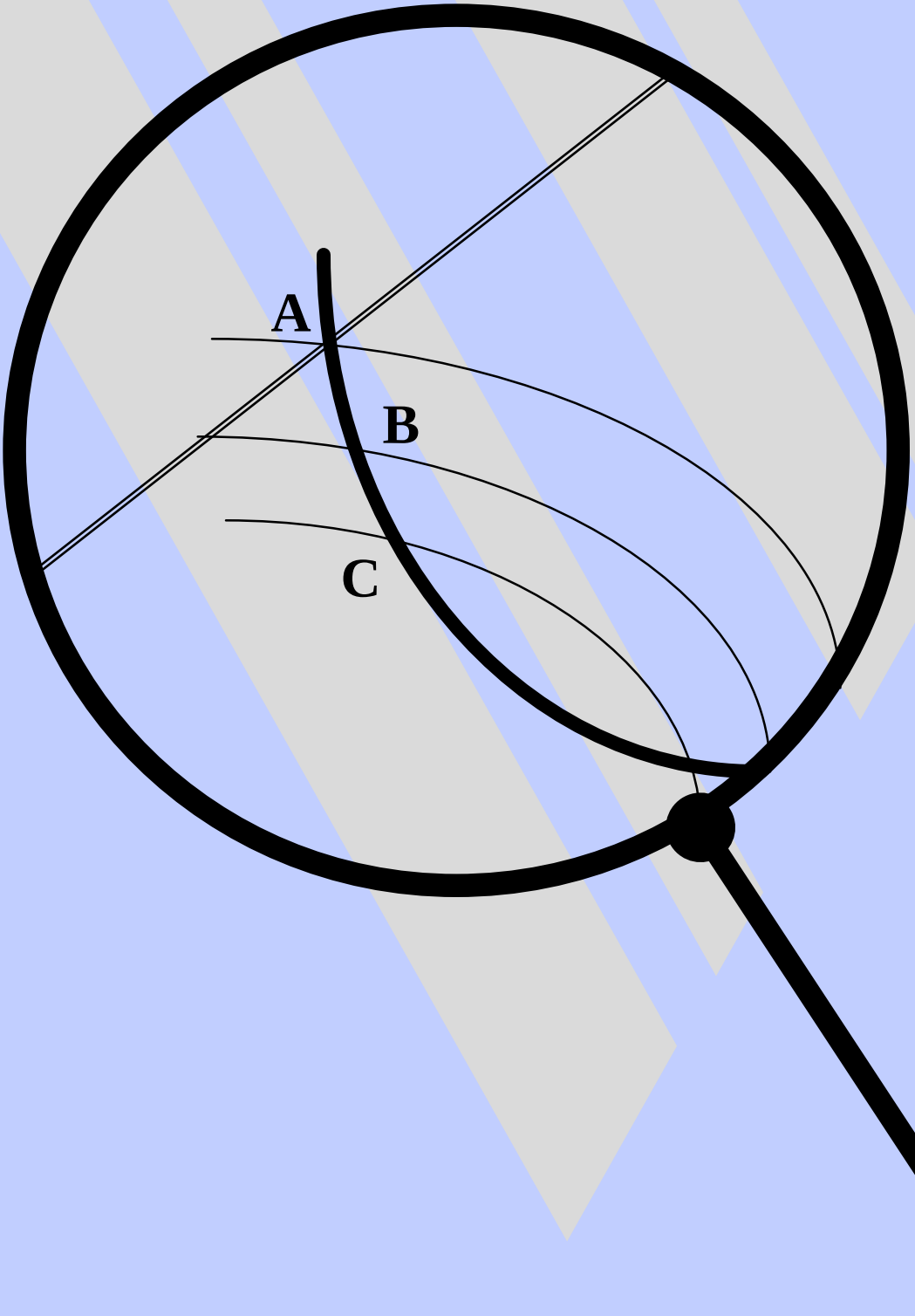
Insight: ***If B is more efficient than A, B must correspond to a point such as B'.***



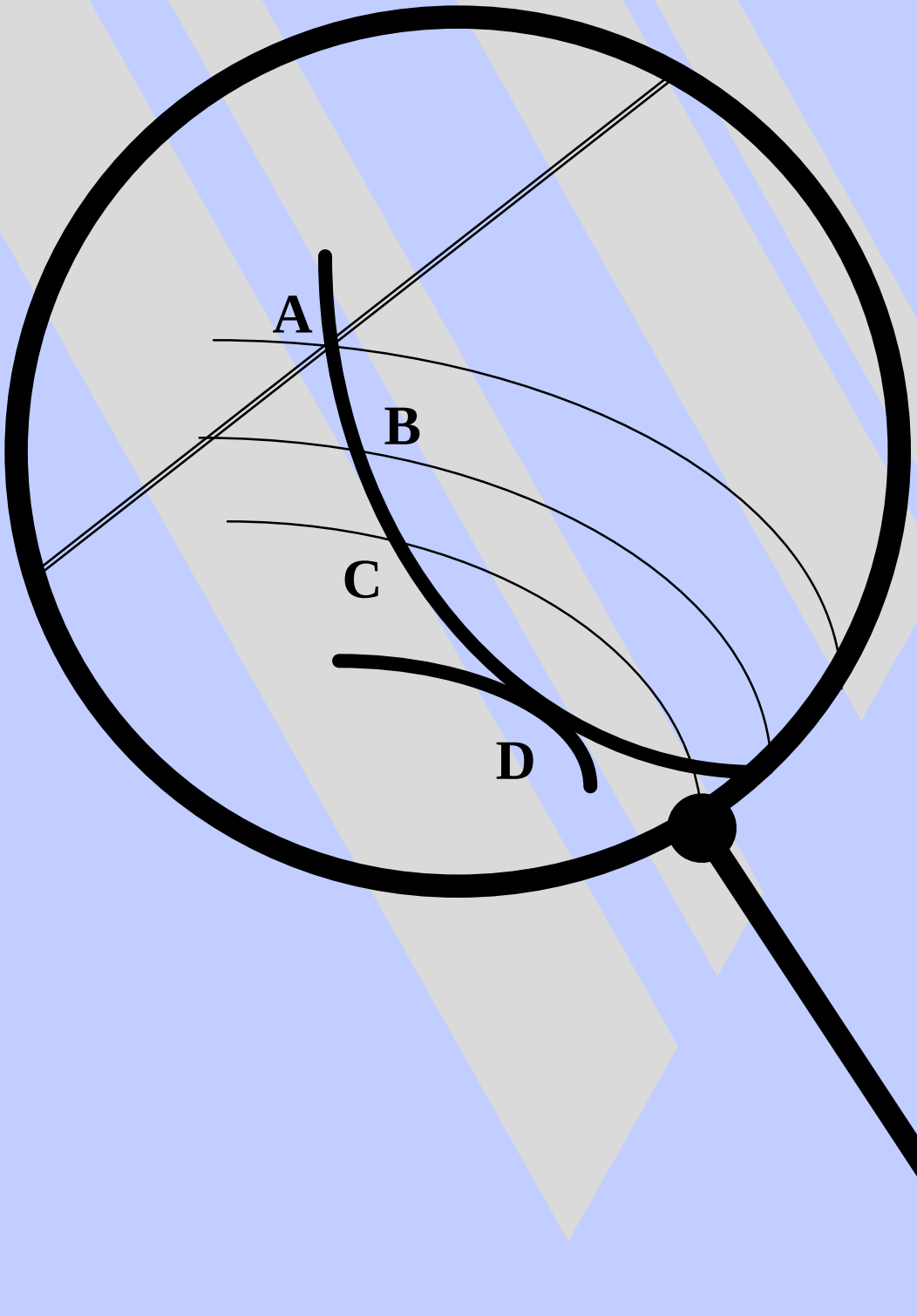
Insight: ***If there are more efficient points than on the Russian RR, the production possibilities curve will be bowed out..***



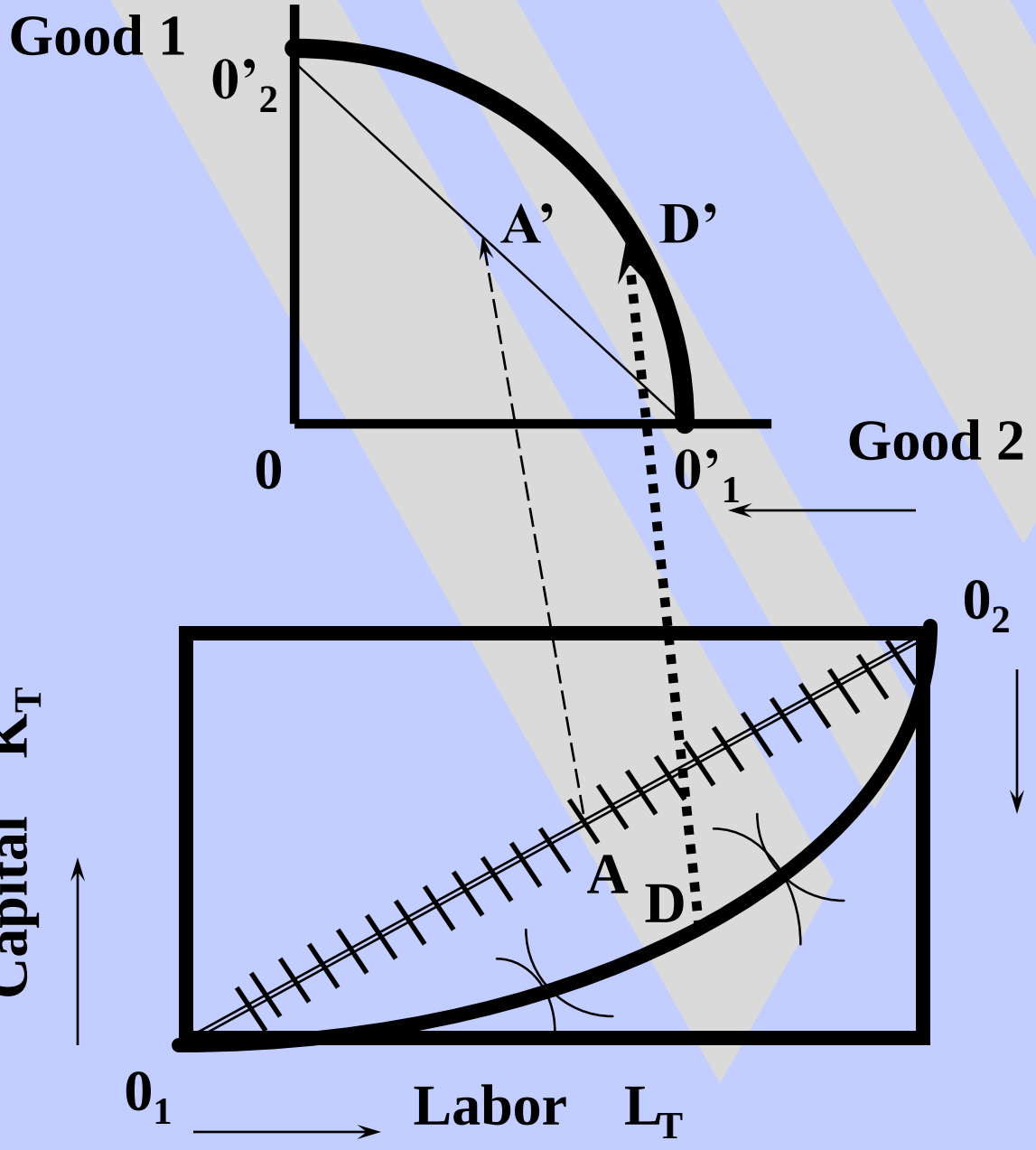
More Efficient Points



Most Efficient Point D

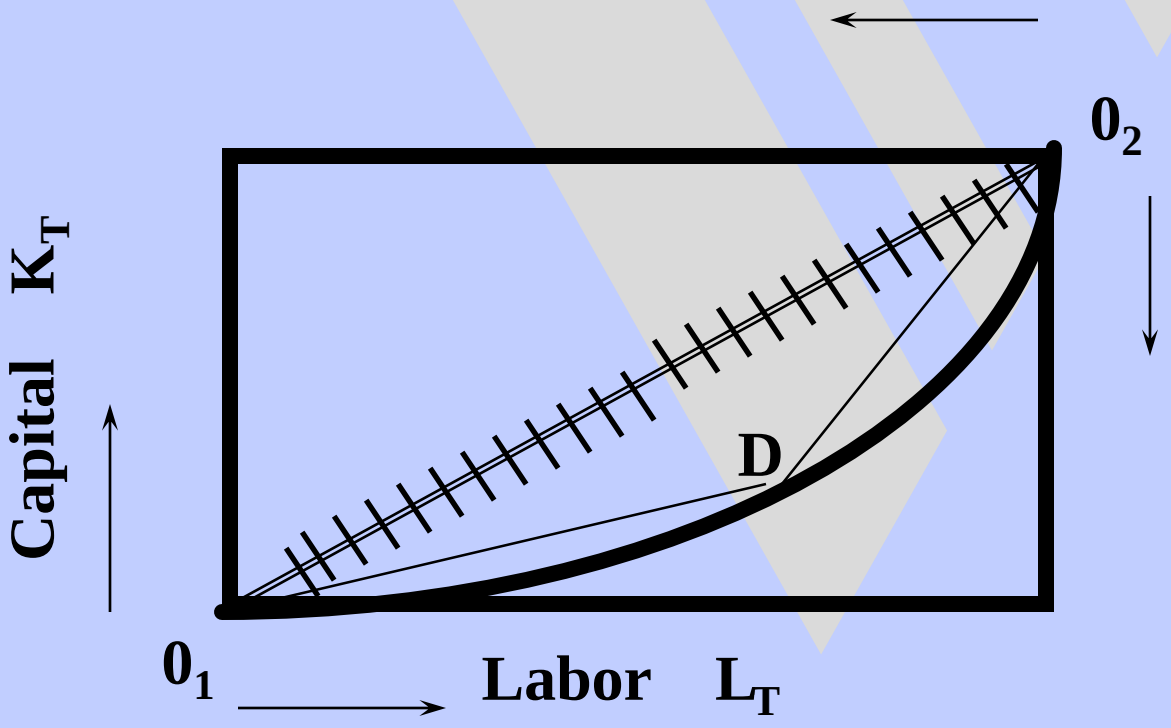


Insight: ***There is a locus of most efficient points where isoquants are tangent corresponding to a bowed out production possibilities curve.***

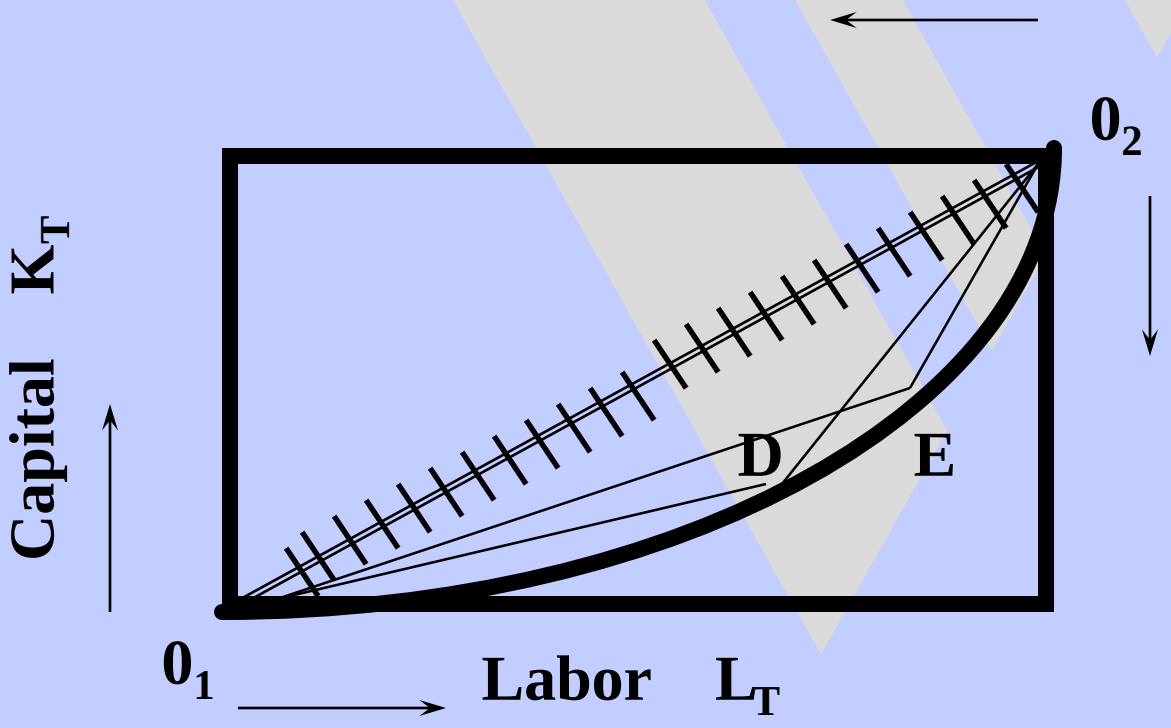


1) Which industry has the higher capital/labor ratio at point D?

2) Where do we see the capital/labor ratios of the two industries?



3) If production increases in industry 1 to point E, what happens to the capital/labor ratios in the two industries?



Is the engineering solution the market solution?

- *Engineering solution is tangent isoquants so slopes of isoquants are the same at efficient points.*
- *Slopes of both are $-MP_L/MP_K$.*
- *Market solution is to set $w/r = MP_L/MP_K$.*
- *Since this happens in both industries, and since w and r are the same for both industries, engineering solution = market solution.*

Factor Intensity

- **An industry is capital intensive if it has a higher K/L ratio than the other industry.**
- **An industry is labor intensive if it has a higher L/K ratio than the other industry.**
- **Increasing production in the labor intensive industry will raise the K/L ratio in *both* industries.**
- **Increasing production in the capital intensive industry will lower the K/L ratio in *both* industries.**

Income Distribution Implication

- **Increasing production in the labor intensive industry will raise the real wage in terms of both products and lower the real rental cost of capital.**
- **Increasing production in the capital intensive industry will raise the real rental price of capital in terms of both products and lower the real wage.**
- **If trade affects the mix of production between the two industries, it will affect the distribution of income between labor and capital.**

Income Distribution Implication

- **In both industries:**

  w/p_i = *real wage in terms of good i* = MP_L *and*

  r/p_i = *real rental cost of capital in terms of good i* = MP_K
- **With constant returns to scale, marginal products are functions of the K/L ratio (as opposed to the absolute amounts of K and L)**
- **MP_L is a positive function of K/L**
- **MP_K is a negative function of K/L**
- **K/L ratio moves in same direction in both industries**
- **If K/L ratios go up, real wages rise and real rental cost of capital falls**
- **Opposite occurs if K/L ratios fall**

Changing Ratios

Pile A

(cannon ball intensive)

1 3

1 3

1 3

Pile B

(weight intensive)

4 6

4 6

4 6

Average = 12 pounds/6 cannon balls = 2 pounds/ball

Average = 30 pounds/6 cannon balls = 5 pounds/ball

<u>Task</u>: Move a ball from pile A to pile B. The cannon ball you transfer from A should be as much like a ball from B as possible.

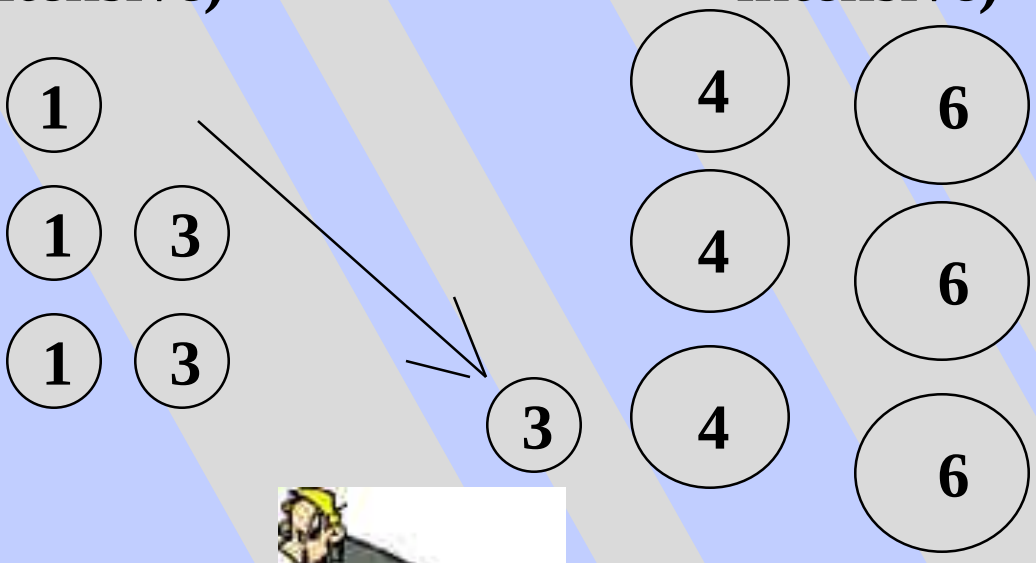
Changing Ratios

Pile A

(cannon ball intensive)

Pile B

(weight intensive)

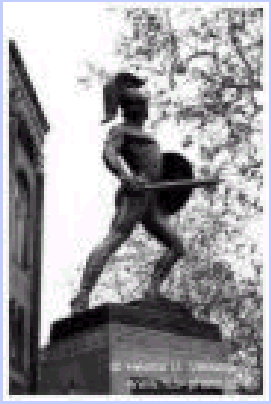


Average = 9 pounds/5 cannon balls = 1.8 pounds/ball

Average = 33 pounds/7 cannon balls = 4.7 pounds/ball

<u>Moral</u>: Pound/ball ratio falls in both piles although overall ratio remains at 42 pounds/12 balls = 3.5 pounds/ball.

UCLA



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